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Value added products of guava

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Value addition favours the availability of guava beyond the seasons, geographic areas and provides consumers with innovative and convenient products. Guava is very popular as a fresh fruit because of its excellent taste, high vitamin content and 100% edibility. This fruit is equally important for the processing industry. Several advanced technologies have been developed in guava for value addition and there is immense scope for diversified value added products of guava. Due to presence of rich amount of pectin, a high quality natural jelly is obtained from guava. Processed guava pulp is an excellent raw material for preparation of various other guava products. Guava juice, nectar are some important products of guava.

Keyword: Guava, Value addition, pectin, juice and wine

1. Introduction

Background and Objectives

Fruits and vegetables are major source of vitamins and minerals. Even though India is the second largest producer of fruits with an annual production of about 45 million tonnes, the per capita availability of fruits even with this increase is lower at 107g/day than the recommended level of 120g. In spite of the India's strong hold on the production of fruits it is alarming to know that India processes just 2% of the total fruit production with an alarming loss of around 35% only 20% of the production of processed fruits is being exported. Karwasra *et al.* (1997), reported that post harvest losses in fruits and vegetables in India is worth about Rs.4000 crores annually. In general physical terms, post harvest losses in these commodities vary from 9 to 40%. India's share of global exports of fresh fruits and processed fruit products is quite meagre when we compare the same with other major fruit producers of the world (Bung, 2012) [4].

The reasons for post harvest losses are improper handling, packaging, and transportation and processing. Among the fruits, guava is an important fruit crop cultivated widely in most parts of India and is one of the richest sources of vitamin C. Guava is available in rainy and winter seasons and the quality of rainy season fruits is inferior. Due to inappropriate handling, transportation and processing 20-25% of guava fruit is totally spoiled before reaching processing technology of guava is extremely needed, to use the produce at the time of surplus and to save it from spoilage. About 10-15% of the total production of fruit is wasted from picking to the end user. It was also explained that about 4% of the production is decreased due to the imperfect collection, mechanical damage, harvesting unripe fruits and inappropriate packing, while about 3% was lost owing to substandard methods of transport, and negligence (Nida *et al.*, 2016). These losses of the seasonal surplus of the guava fruit can be avoided by processing and preserving the fruit into different value added products like guava juice, pulp, nectar jam and jelly, wine, toffee as well as being used as an additive to other fruit juices or pulps (Leite *et al.* 2006). With the changing consumer attitudes, demands and emergence of new market products, it has become imperative for producers to develop

products, which have nutritional as well as health benefits.

In this context, guava has excellent digestive and nutritive value, pleasant flavour, high palatability and availability in abundance at moderate price. It is a very popular fruit and it is available throughout the ye ar except summer season. The nutritive value of the fruit is very high thus is an ideal crop for the nutritional security. Value added food products are raw or pre-processed commodities whose value has been increased through the addition of ingredients or processes that make them more attractive to the buyer and/or more readily usable by the consumer. The fresh fruit has limited shelf life therefore, it is necessary to utilize the fruit for making different products to increase its availability over an extended period and to stabilize the price during the glut season. These products have good potential for internal as well as external trade. In the present review, information was provided on different value added products of guava and its multipurpose commercial value.

World Trade for the Processed Guava Products was likely to have a steady and significant increase. At present, the Products that were being Processed from Guava include; ascorbic acid (Vitamin C), canned slices, cheese, concentrates, dehydrated products, jam, jelly, juice, nectar, pectin, puree, spread, syrup and yoghurt. Purified and cloudy Guava juices had been currently produced and have a greater Market Potential.

Value added products of guava

***Guava pulp*:** The guava fruits are highly perishable in nature and cannot be stored for more than a week in winter and 2-3 days in rainy season. Guava fruits can be processed

and preserved in the form of pulps which can be converted into juice, ready-to-serve beverages, nectar *etc*. During off-season, Bottled guava pulp of cv. Allahabad Safeda and Banarasi Surkha stored at room temperature with 2000 ppm potassium metabisulphite (KMS) retained its highly acceptable quality up to 6 months after which it can be utilized for the preparation of ready-to serve drink and guava leather (Harsimrat and Dhawan, 2013) [8]. The pulp is extracted from guava fruits by blending the cut pieces of fruits with water (up to 20 %) and filtering out the seeds. The pulp is heated to 75-78°C and stored with 1000 ppm S02 in airtight containers aseptically packaged. Guava pulp of good quality can be preserved with potassium metabisulphite and stored in food grade plastic jars at low temperature (2-5°C) for 3 months. (Harsimrat and Dhawan, 2013) [8]. Guava pulp is used for ethanol production (Srivastava *et al.*, 1997) [18].

Guava juice

Juice may be obtained either from fresh guava fruits or stored pulp. Juice from fresh fruit is extracted by squeezing guava pieces through a hydraulic filter press. Juice could be made from pulp by diluting it with water and filtration. Guava juice could also be blended with other fruit juices like pear, apple, mango, *etc*. Fruit juices are usually cloudy, colloidal suspensions. Manufacture of clear juice, from guava and many other tropical fruits is difficult.

The colloidal particles which cause turbidity in the juices carry flavour substances and natural antioxidants. The fruits also have a large content of carotenoids which are retained in the structural tissue during pressing. The use of pectic enzymes in association with fining agents in fruit processing is essential to get better juice yields, improve filtration rate and produce clear juices of high quality for the concentration process (Isabella *et al.*, 1995) [9]. The use of enzymes to maximize the yield of cloudy juice and promote clarification is uncommon in the production of guava juice. Commercial preparations containing pectinases, arabinase and cellulase may benefit guava juice production. Pectinase assists in pectin hydrolysis, which causes a reduction in pulp viscosity and a significant increase in juice yield.

Arabinase and cellulase convert araban and cellulose to soluble sugars that increase the soluble solids (SS). Arabinase also assists in eliminating the turbidity of juice caused by araban, which is visible only after 3-4 weeks of storage. (Askar *et al.* 1992) [1]. Yield of cloudy juice is significantly affected by the temperature and time used for enzyme treatments. Increasing exposure time elevates yield but also causes a

reduction in ascorbic acid content of the juice due to oxidation (Imungi *et al.* 1980) [10].

For clarifying guava juice (600 ppm of pectic enzyme; 45°C during 120 min in association with fining agents: silica sol and gelatin) showed good results with juice yield of 84.70%. The product showed good stability in regard to the chemical and physico-chemical changes during processing that could affect nutritional and organoleptic characteristics. (Isabella *et al* 1995) [9]. The commercial enzyme Pectinex Ultra SP-L® at 700 ppm with incubation period 1.5 hr and at temperature 50°C was successfully applied to guava puree that resulted in a 51% reduction in viscosity, 13% increase in ascorbic acid content and 18% increase in yield of a clearer juice.

In terms of clarity, guava juice prepared using Ultra Filtration was clearer with 89.6% transmission, as compared to 82.8% for plate and frame filtered juice. However, plate and frame filtered juice retained more soluble solids, contained 5.8% more ascorbic acid than the UF juice and had higher flux rates at all times (Chopada and Barrett 2001) *Blended RTS beverags* : Guava (*Psidium gujava* L.), is a good source ofvitamin -C, has a strong flavour and taste with good nutritional quality but fruit pulp is not attractive in colour. Hence it is used to prepare RTS beverages blending with other fruit pulps like 20% Aonla pulp (Poonam and Tondon, 2007), 30% papaya, Tiwari (2000) [19] and dairy products. Whey based beverages are prepared by utilizing dairy waste. Carbonation enhanced the storage stability.

Finished guava beverages contained 13% total solid and 25-30mg Vitamin C, when compared to plain guava beverages (Pritam chandra). Whey or milk serum and guava beverage is prepared in a ratio of 67.5:20 (%) as it gave good colour, flavor, aroma, taste mouth feel and overall acceptability. (F.M.Bhat & R.Singh 2014). Jakhar *et al.*, 2013 studied the suitable blending of guava and Barbados cherry pulps to prepare RTS beverages. Blending 50% Guava and 50% Barbados cherry pulps with 12% TSS and 0.2% acidity was found to be the best. They also reported that blended RTS was found to be acceptable up to five months of storage at ambient temperature with good appearance, flavour, taste and overall acceptability. Pink varieties are better suited for beverage preparation, owing to their attractive colour. From 100 kg of red flesh guava, 247 litres of RTS beverage could be obtained. The cost:benefit ratio and value addition from this process were worked out at 1.79 and Rs. 5.45/ kg of fruit, respectively. (Bhuvaneswari and Tiwari 2007) [3].

Guava pectin

Pectin is a naturally occurring substance present in all plant tissue, calcium pectin being present between the cell walls and serving as a strengthening or building agent. It is very widely used in food and food processing industries. For example, it is used in preparation of jam,jelly, sauces, pickles, ice cream, and confectionary. It is being observed that maximum pectin yield is obtained (0.09%) for spent guava extract at 80°c as compared with lime peel and apple pomace. So according to experimental studies spent guava extract was found to be most suitable for pectin extraction. Finally the extracted pectin is used to formulate various types of processed fruit products and others e.g. jelly, jam, marmalade, synthetic jelly, thickener and stabilizer etc. (Chakraborty and Ray 2011) [2].

Conclusion

Consumers are more and more concerned with food of high nutritional quality providing health benefit, such as fruits. India produces around 237 million tonnes of fruits and vegetables out of which 35.58 million metric tonnes is wasted. India can become one of the largest fruit and vegetable exporters in the world and can equally be a large importer given its demographic diversity. This strong footing in agriculture provides a large and varied raw material base for food processing. Present processing companies have the utilisation capacity of 3.38 million tonnes only. Therefore, it is evident that there is lot of scope for setting up processing industries. Utilisation of value addition technologies processes of by-product utilisation and available machinery would not only reduce the post harvest losses but also increase the percentage of employment which is currently 29% in food processing industries. Guava is one of the best

crops suited for value addition. Guava shares 3.5% of total fruit production. Several advanced technologies have been developed in guava for value addition and there is immense scope for diversified value added products of guava. Development of low cost processing technologies, value addition through extension of shelf life and processing of marketable surplus into value added products, utilization of food industries waste/ by products are the key areas to be focussed to increase the share of value added products in Indian exports.

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