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Studies on development and organoleptic evaluation of blended guava-pineapple jelly incorporated with *Aloe vera*

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Abstract

The jelly was prepared by blending Guava and Pineapple juice extracts (80% - 20%) of predetermined ratios. *Aloe vera* being highly medicinal and containing bioactive compounds was added to make the jelly more nutritious. The extracted *Aloe vera* gel was mixed with the blended Guava-Pineapple juice extracts and allowed to cook on continuous boiling\stirring and standardized proportions of pectin, sugar and citric acid were added. 0.5-1% of pectin in extract is sufficient to produce good quality jelly. Final jelly should contain at least 0.5% acid. In final product optimum pH value for jelly is 3.1. *Aloe vera* gel was added in the different quantities of 20%, 30% and 40%. After cooking the jellies were filled into pre-sterilized glass bottles and allowed to cool. The jelly was then served to the panelist members to check the acceptability of *Aloe vera* in the jelly and sensory evaluation of the jelly was concluded by the 9 point hedonic scale ratings. The sensory parameters like appearance, color, taste, texture, flavour and overall acceptability of the jelly samples were evaluated. The results showed that sample containing 30% of *Aloe vera* gel exhibits good sensory attributes.

Keywords: *Psidium guajava* L., *Ananas comosus* (L.), *Aloe barbadensis* Miller, jelly, pectin

Introduction

Jelly is an easily digestible, appetizing and nutritionally far superior than mainly synthetic drinks and some confectionary products which are consumed on a daily basis. Jellies are the crystal clear products brought to a semisolid consistency and made from the strained juice or aqueous extracts of one or more fruits, mixed with foodstuffs with sweetening properties, with or without addition of water. Jelly should hold its shape but be soft enough to spread. Jelly is made by concentrating the mixture of strained juice, sugar, pectin etc. to not less than 65% Total Soluble Solids. Processing of fruits and vegetable to the jelly and other valuable products are way abundant fruits and vegetables can be utilized to reduce the wastage and bring economic returns to the farmer. Fruits generally used for making jelly are guavas, grapes, strawberry, apples, mango, pineapple, etc. (Palve *et al.*, 2014) [15].

Guava is a rich source of pectin and acid content and have thick flesh and is preferred for jelly making. Guava (*Psidium guajava* L.) is native of tropical America and belongs to family *Myrtaceae*. It is the apple of the tropics and is one of the most common fruits of India. It is the 5th important fruit crop in India with a production of 1.85 million tonnes from an area of 1.60 lakh hectare (Anon, 2009) [1]. It is mainly produced in the state of Bihar, Uttar Pradesh, Karnataka, Madhya Pradesh, Gujarat, Andhra Pradesh, Maharashtra, Punjab, Haryana and Tamil Nadu. It excels to most of the other fruits in productivity, hardiness, wide adaptability and vitamin C content. It is a rich source of ascorbic acid, pectin and contains considerable amounts of calcium, potassium.

Guava is rich in tannins, phenols, triterpenes, flavonoids, essential oils, saponins, carotenoids, lectins, vitamins, fiber and fatty acids. Guava fruit is higher in vitamin C than citrus (80 mg of vitamin C in 100 g of fruit) and contains appreciable amounts of vitamin A as well. Guava fruits are also a good source of pectin - a dietary fiber. *Psidium guajava* or guava is very rich in antioxidants and vitamins and also high in lutein, zeaxanthine and lycopene (Tee *et al.*, 1997; Hobert and Tietze, 1998) [23] [9]. The flavonoids have demonstrated antibacterial activity. Quercetin is thought to contribute to the anti-diarrhea effect of guava; it is able to relax intestinal smooth muscle and inhibit bowel contractions. Harvesting of guava is done from mid October to the end of January in the Malwa region of Madhya Pradesh. Guava is a seasonal fruit and is highly perishable. It is normally consumed fresh as dessert fruit that is pleasantly sweet and refreshing in flavour. Short storage life (6-8 days) limits strategic selling of fresh guava fruit. Under these conditions guava growers fail to get attractive returns and nearly 20-25% of produce goes as ravage (Nidhi and Prasad 2006) [13].

Various processed products are made from guava viz. jam, jelly, cheese, canned fruit segments, Ready to serve drink, nectar, squash, dried powder, ice cream, highly concentrated puree, candy, toffees, syrup, juice and concentrate (Jain and Asati, 2004) ^[10]. It minimizes post harvest losses, enhances its economic and nutritive value by fortification. Guava is universally known for its jelly as it is very rich in pectin.

Pineapple [*Ananas comosus* (L.) Merr. Family: *Bromeliaceae*] is one of the most important commercial fruit crops in the world. It is known as the queen of fruits due to its excellent flavour and taste (Baruwa, 2013) ^[2]. Pineapple is the third most important tropical fruit in the world after Banana and Citrus (Bartholomew *et al.*, 2003) ^[3]. Pineapples are consumed or served fresh, cooked, juiced and can be preserved. This fruit is highly perishable and seasonal. Mature fruit contains 14% of sugar; a protein digesting enzyme, bromelin, and good amount of citric acid, malic acid, vitamin A and B (Joy, 2010) ^[11]. Various food items like squash, syrup, jelly are produced from pineapple. Vinegar, alcohol, citric acid, calcium citrate etc. are also produced from pineapple. Pineapple is also recommended as medical diet for certain diseased persons (Moniruzzam, 1988) ^[12]. The U.S. National Library of Medicine lists bromelain as a proteolytic digestive enzyme. Pineapple fruits exhibit high moisture, high sugars, soluble solid content ascorbic acid and low crude fibre. Thus pineapple can be used as supplementary nutritional fruit for good personal health. Pineapple fruits are an excellent source of vitamins and minerals. One healthy ripe pineapple fruit can supply about 16.2% of daily requirement for vitamin C (Hemalatha and Anbulselvi, 2013) ^[8].

Aloe vera (synonym: *Aloe barbadensis* Miller) belong to *Liliaceae* family. It is a stemless or very short-stemmed succulent plant which grows to 60-100 cm (24-39 in) tall, spreads by offsets, and its leaves are very thick and fleshy with the profound colour of green to grey-green. Some of its varieties show white flecks on the upper and lower stem surfaces. The leaf has serrated margin with small white teeth. The perimetric bundle sheath cells give rise to bitter, yellow exudates. (Sampathkumar *et al.*, 2010) ^[18]. *Aloe vera* is a perennial succulent xerophyte, which develops water storage tissue in the leaves to survive in dry areas of low or erratic rainfall. *A. vera* has been used for many centuries for its curative and therapeutic properties and although over 75 active ingredients from the inner gel have been identified, therapeutic effects have not been correlated well with each individual component (Habeeb *et al.*, 2007) ^[6]. Many of the medicinal effects of aloe leaf extracts have been attributed to the polysaccharides found in the inner leaf parenchymatous tissue (Ni and Tizard, 2004 and Ni *et al.*, 2004) ^[14], but it is believed that these biological activities should be assigned to a synergistic action of the compounds contained therein rather than a single chemical substance (Dagne *et al.*, 2000) ^[5].

Aloe vera is the most commercialised aloe species and processing of the leaf pulp has become a large worldwide industry. In the food industry, it has been used as a source of functional foods and as an ingredient in other food products, for the production of gel containing health drinks and beverages. The innermost layer of leaf gel contains water up to 99%, with glucomannans, amino acids, lipids, sterols and vitamins (Brown, 1980 and Reynolds and Dweck, 1999) ^[4] ^[17]. The other potentially active ingredients include vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids (Vogler and Ernst, 1999 and Shelton, 1991) ^[25] ^[20]. It has numerous monosaccharide's and polysaccharides; vitamins B1, B2, B6, and C; niacinamide

and choline, several inorganic ingredients, enzymes (acid and alkaline phosphatase, amylase, lactate dehydrogenase, lipase) and organic compounds (aloin, barbaloin, and emodin) as described by (Hayes, 1999) ^[7].

The bioactive compounds are used as an astringent, hemostatic, antidiabetic, antiulcer, antiseptic, antibacterial, anti inflammatory, antioxidant, and anticancer agent also, effective in treating stomach ailments, gastrointestinal problems, skin diseases, non-constipation, radiation injury, wound healing, burns, dysentery, diarrhea and in the treatment of skin diseases (Rabe and Staden, 1997) ^[16]. The five Phytosterols of *Aloe vera*, lophenol, 24methyl lophenol, 24 ethyl lophenol, cycloartanol and 24 methylene cycloartanol showed antidiabetic effects in Type 2 diabetic mice (Tanaka *et al.*, 2006) ^[22]. *Aloe vera* contains polysaccharides which increase the insulin level and show hypoglycemic properties (Yagi *et al.*, 2006) ^[26]. *Aloe vera* emodin and anthraquinone, has the stability to suppress or inhibit the growth of malignant cancer cells making it to have antineoplastic properties (Thamson, 1971) ^[24]. Aloe juice is helpful in smooth functioning of the body machinery (Saroj *et al.*, 2004) ^[19].

Materials and Methods

Materials

The fresh guavas and ripe pineapples were obtained from local village market, Parbhani. *Aloe vera* was obtained from the College garden. The proposed research was carried out in Department of Food Engineering, College of Food Technology, VNMKV, Parbhani.

Methods

Preparation of Guava juice extract

Clean and diseased free guavas were selected, eyes were peeled off and the guava were cut into the pieces. It was then subjected to the boiling with equal quantity of water. Citric acid was added during boiling. The juice extract was then filtered with the muslin cloth.

Preparation of Pineapple juice extract

Ripe pineapples were selected. The crown portion and ground portion were removed and the fruit was washed. The eyes and barks were then peeled off and it was sliced. It was then subjected to the boiling, it was then grinded. Citric acid was added during boiling. The juice was then filtered with the muslin cloth.

Preparation of *Aloe vera* gel

The aloe leaves were harvested and washed. The leaves were soaked into the water for 5 mins. The leaves were then trimmed with the help of knife and the above green rind portion was removed. The gel was extracted by the hand filleting with help of knife or spoon. The gel was then grinded for proper mixing.

Preparation of jelly from blended juice extracts and *Aloe vera*

The Guava and Pineapple juices were blended in the ratios 80:20. The jelly prepared from this blend was considered to be the controlled jelly. The jelly was prepared with the blended juices with the incorporation of *Aloe vera* of different blending ratios. The jelly was prepared by boiling the juices with the addition of sugar (55%) and pectin (1%) until 65° Brix was obtained.

T₀ = 80% Guava extract + 20 % Pineapple extract
 T₁ = 80% of Guava-Pineapple blend (T₀) + 20% *Aloe vera*
 T₂ = 70% of Guava-Pineapple blend (T₀) + 30% *Aloe vera*
 T₃ = 60% of Guava-Pineapple blend (T₀) + 40% *Aloe vera*

Table 1: Standardized recipe for the preparation of Blended Guava-Pineapple jelly incorporated with *Aloe vera*

Samples	Juice extractss (ml)	Sugar (%)	Acidity (%)	Pectin (gm)
T ₀	500	55	0.6	1
T ₁	500	55	0.6	1.8
T ₂	500	55	0.6	2.2
T ₃	500	55	0.6	2.6

Organoleptic evaluation of Blended Guava-Pineapple jelly incorporated with *Aloe vera*

The best blended jelly was selected with the help of organoleptic evaluation (sensory evaluation) which was conducted on 9 point hedonic scale for different sensory attributes like appearance, color, flavour and overall acceptability by a panel of 10 semi-trained judges having the prior experience of sensory evaluation.

Flow chart

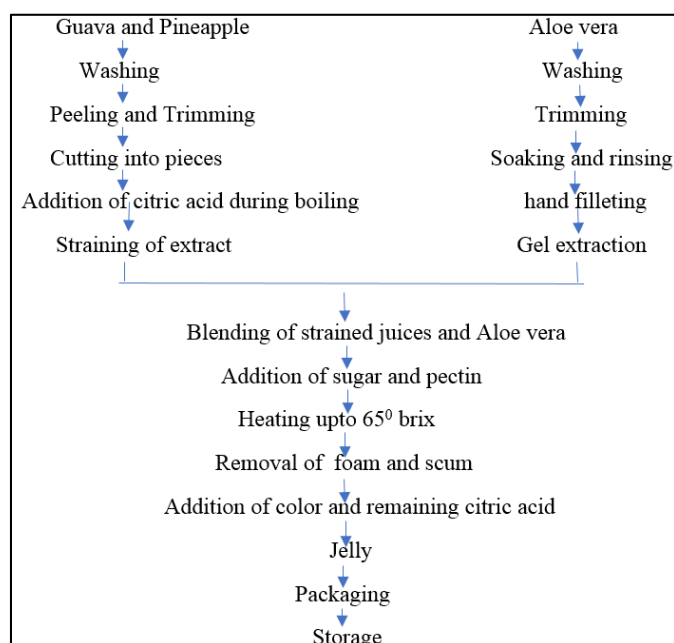


Fig 1: Process flowchart for preparation of Blended Guava-Pineapple jelly incorporated with *Aloe vera*

Result and Discussion

Table 2: Mean sensory score values for Blended Guava-Pineapple jelly incorporated with *Aloe vera*

Samples	Appearance	Color	Taste	Texture	Flavour	Overall Acceptability
T ₀	8.7	9	8.5	9	9	8.8
T ₁	8.5	8.5	8.0	8.0	7.5	8.1
T ₂	8.7	9	8.5	8.5	8.5	8.6
T ₃	8.0	8.0	7.9	7.6	7.5	7.8

Data pertaining to sensory evaluation of blended Guava-Pineapple and *Aloe vera* jelly with respect to appearance, colour, flavour, taste and overall acceptability were carried out. Accordingly, results obtained are depicted in table. 2. Data indicated in the table: 2. Showed that the sample Control and T₂ are the most acceptable product. The blended jelly T₂

(30%) of *Aloe vera* gel incorporation received highest sensory score (i.e., 8.6) in case of all sensory attributes followed by other treatment samples T₁ and T₃ respectively. The average sensory attributes scores of prepared blended jelly (Control) were analyzed for variance among the jelly prepared by different samples containing different levels of *Aloe vera* gel. Control sample got the highest score (8.8) and sample T₃ got the lowest score (7.8). In case of appearance control sample and T₂ sample got the highest score (8.7) and T₃ got the lowest score of (8.0). In case of the color also control sample and T₂ sample got the highest score (9) and T₃ got the lowest score of (8.0). In the terms of taste control sample and T₂ sample got the similar scores (8.5) and the lowest score is of T₃ (7.9). In case of flavor and texture jelly prepared from control and T₂ got the highest score (9 and 8.5) respectively. Sample T₃ got the lowest score (7.5 and 7.6), respectively. In terms of overall acceptability Control sample and T₂ sample had high score (8.8 and 8.6) respectively. And T₁ sample and T₃ sample got the least score (8.1 and 7.8) respectively. From the above discussion we can conclude that sample T₂ showed near about same score of sample Control. Therefore, sample Control and T₂ were selected for further studies.

Conclusion

In present investigation efforts were made to develop blended Guava-Pineapple jelly with various proportions of added *Aloe vera* gel. The study revealed that the organoleptic characteristics of blended Guava-Pineapple jelly incorporated with *Aloe vera* viz., colour, flavour, taste, and overall acceptability were significantly influenced by different recipe treatments. It can be finally concluded that blended Guava-Pineapple jelly incorporated with 30 % *Aloe vera* juice received highest sensory score (i.e., 8.6) in case of all sensory attributes and was found to be most acceptable with reference to Control sample.

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