Preparation and evaluation of guava-banana peel jelly

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 Received: 04.11.2021/Accepted: 06.12.2021

ABSTRACT

The present study was conducted in the food processing laboratory of RVS School of Engineering and Technology, Dindigul, Tamil Nadu during 2019. The experiment comprised the preparation, standardization, evaluation and analysis of jelly prepared using guava peel and banana peel powder in various combinations viz S1: Jelly with guava peel (250 g) and banana peel powder (2.5 g), S2: Jelly with guava peel (250 g) and banana peel powder (5 g), S3: Jelly with guava peel (250 g) and banana peel powder (10 g) and S0: Control (jelly with guava peel 250 g). Standardization of jelly was done using banana peel powder in the range of 2.5-10 g. Sensory evaluation was carried out using 9-point hedonic scale. Nutritional characteristics such as carbohydrates, moisture, ash, acidity, sugar and pH of jelly samples were analyzed. The results revealed that the sample S1 ranked good in its organoleptic qualities. It was observed that the nutritional characteristics as well as physiochemical properties of sample S1 (jelly with guava peel + banana peel powder 2.5 g) were better than the control sample S0 (control).

Keywords: Guava; banana; jelly; guava-banana peel jelly; nutrient composition

INTRODUCTION

Guava (*Psidium guajava* L) is native to tropical America and belongs to family Myrtaceae. It is one of the important commercial fruits in India. It is the fourth most important fruit after mango, banana and citrus (http://nhb.gov.in/model-project-reports/Horticulture%20Crops/Guava/Guava1.htm). Guava fruits either raw or ripe are prominently valued for their pulp. The fruit is an excellent source of pectin and acid content and has thick flesh. It is preferred for jelly making but has low energy (66 cal/100 g) and protein content (1%), dry matter (17%) and moisture (83%). It consists of various vitamins and minerals like vitamin A, ascorbic acid (75-265 mg/100 g of pulp), thiamin, riboflavin, niacin and phosphorus (17.8-30 mg/100g of pulp) (Das et al 1995). It is now processed commercially into jam, jelly, canned guava segments in syrup, nectar, juice etc.

Banana (*Musa paradisiaca*) is one of the most widely grown fruit crops in India. The area under banana accounts for 47 per cent of the global production. Banana peels account for 40 per cent of the total weight of the fresh fruit (Naggarajaiah and Prakash 2011). These are thick ropey-textured and green to yellow coloured. The peel is rich in antioxidants, protein, sugar, fiber, ash, potassium, sodium etc. They are used as food for animals, in water purification, for manufacturing of several biochemical products and are packed with nutrients. Since banana is an important agricultural crop, its peel can be proven as a source of antioxidant dietary fiber and there is a great potential to prepare value-added health products from the peel.

Fruits and vegetable processing waste is highly perishable and seasonal and is a problem to the processing industries and pollution monitoring agencies. This problem can be recovered by utilizing its high value compounds including the dietary fibre fraction that has a great potential in functional foods preparation.

The storage of fruits is very difficult for longer period because of the perishable nature especially under the tropical conditions. It is common experience that 20-25 per cent fruits are completely damaged and spoiled before they reach the consumer (Kumar et al 2020). Therefore it is necessary to utilize such perishable fruits by processing them in the form of fruit jams or jellies and thereby minimizing the post-harvest losses and enhance their economic and nutritive value. An important byproduct that can be obtained from fruit waste is pectin. The main use for pectin (vegetable agglutinate) is as a gelling agent, thickening agent and stabilizer in food. The classical application gives the jelly-like consistency to jams, jellies or marmalades which would otherwise be sweet juices (Devi et al 2014). Jelly is a fruit flavored dessert which is made by warming and then cooling a liquid containing gelatin or a similar setting agent in a mould or dish so that it sets into a semi-solid, somewhat elastic mass which is the kind of sweet. The main ingredients for the jelly preparation include fruit extract, pectin, sugar and citric acid.

In the present study, peels of guava and banana were utilized for the preparation of jelly. Generally guava fruit is used for preparation of standard jellies. The incorporation of banana peel powder into the standard guava jelly at different formulations may enhance the nutritive qualities of the produced jelly. Since guava peel and banana peel are having high nutritive values, combination of these two in the form of jelly thus provides a better product. Research was carried out to prepare jelly from guava peel with different proportions of banana peel powder and to analyze the prepared jelly.

MATERIAL and METHODS

The experiment was carried out in the food processing laboratory of RVS School of Engineering and Technology, Dindigul, Tamil Nadu in the year 2019. Fresh guava fruits and banana of good quality were collected from the local market of Dindigul. The guavas of optimum maturity were chosen as these contain maximum pectin content in that stage. Materials like sugar, citric acid, pectin and other relevant items required for the study were received from the laboratory stocks. The treatments used were S1: Jelly with guava peel (250 g) and banana peel powder (2.5 g), S2: Jelly with guava peel (250 g) and banana peel powder (5 g), S3: Jelly with guava peel (250 g) and banana peel powder (10 g) and S0: Control (jelly with guava peel 250 g).

Preparation of banana peel powder: The fresh ripe bananas were selected for the jelly preparation. The peel of the banana was taken out and soaked in 0.05 per cent sodium metabisulphite solution for an hour to prevent discoloration. The treated banana peels were dried in the hot air oven at 55^{o}C for 24 hours (Castillo-Israel et al 2015). The oven-dried peels were cooled at ambient temperature and then powdered.

Preparation of jelly from guava peel and banana peel powder: The fresh and mature guava fruits were taken for jelly preparation. Guava fruit that is still in the ripening stage contains more pectin than the ripened guava. Pectin is a thickening substance that helps to give consistency to the jelly. The guava fruits were washed, peeled, seeds removed and peels were cut into very small pieces. About 250 g of guava peels were boiled with 500 ml of water for 30 minutes. The extract was strained using a muslin cloth and then boiled with required quantity of sugar (80 g). Citric acid and pectin were added during boiling. Prepared banana peel powder was added to the mixture at this stage in various proportions (2.5 g to S1, 5 g to S2 and 10 g to S3) to make different samples of guava and banana peel jelly (S1, S2 and S3). The end point of jelly was judged by sheet test and by using a hand refractrometer. A small portion of jelly was taken out during boiling in a spoon and was then allowed to drop. The product falling off from the spoon in the form of sheet was considered as the end point of the prepared jelly. The end point was also estimated by 65-68 per cent total soluble solids (^{o}Brix) in the jelly mixture. Jelly was filled into glass jars and stored in a refrigerator for about 12 hours.

Total soluble solids (TSS) of the jelly samples were determined using a hand refractrometer. Various nutritional and physiochemical parameters like carbohydrates, fat, protein, sugar, pH, moisture, ash and acidity of the prepared jelly samples were analyzed. These parameters were tested in the Envirocare Food Processing Laboratory, Madurai, Tamil Nadu. Moisture, ash and protein percentages were determined according to the method specified by Latimer (2016). Acidity percentage was determined by titration with standard solution of sodium hydroxide. The pH was measured by a microprocessor-based pH meter. Sugar and fat contents were determined by method as described by Anon (2016).

The prepared samples viz S1, S2, S3 and S4 were evaluated by sensory panel. The sensory evaluation of the jelly samples was carried out

according to the standard methods as recommended by Joshi (2006) on 9-point hedonic scale. Score card was set by keeping in opinion the quality characteristics of the product. Descriptive terms were given to various quality attributes like consistency, colour, appearance, sweetness, mouth feel, flavour and overall acceptability of the product. Numerical scores were allocated to each attribute. While scoring, highest score (9) was assigned to the most preferred quality characteristic and least (1) to the least desired quality characteristic.

RESULTS and DISCUSSION

Yield of jelly: The quantity of the jelly in the control sample (S0) was observed as 75 g which was less than the other samples S1 (90 g), S2 (95 g) and S3 (98 g) because of the addition of banana peel powder in different proportions of 2.5 g, 5 g and 10 g.

Nutritional analysis of the jelly: The nutritional composition of the prepared jelly samples is given in Table 1. The nutritional status of the sample S3 (Jelly with guava peel 250 g and banana peel powder 10 g) was observed greater as compared to other samples. This might be due to the enhancement of nutritional qualities with addition of banana peel. The banana peel is rich in antioxidants, protein (7.7%), fiber (8.6%), ash (10.5%), potassium, sodium etc. The control resulted in lower nutritional value as compared to other samples. The value of moisture content of control sample was found maximum due to the high content of guava alone as compared to other formulations.

Table 1. Nutritional composition of guava and banana peel jelly

Component	Composition (%)			
	Control	S1	S2	S3
Fat	0.90	1.30	1.54	1.54
Protein	2.50	3.40	3.90	3.90
Carbohydrate	14.30	21.70	23.30	23.30
Ash	0.30	0.60	0.60	0.60
Moisture	82.00	73.00	70.00	70.00

Table 2. Physiochemical parameters of guava and banana peel jelly

Parameter	Control	S1	S2	S3
pH	3.46	3.30	3.50	3.70
Acidity (%)	0.091	0.099	0.110	0.115

Physiochemical characteristics of jelly: The physiochemical properties of the prepared samples are given in Table 2. The pH was found to be in the range of 3.30 to 3.70; which is acidic in nature. The physiochemical properties of the sample S3 (Jelly with guava peel 250 g andbanana peel powder 10 g) were observed higher as compared to other samples. The values of pH and acidity of sample S3 were determined as 3.70 and 0.115 per cent respectively. The control sample resulted in lower physiochemical properties as compared to other samples. The pH of the jelly sample is very important since it helps in the formation of optimum gel in the preparation of jelly. The acidity is an imperative fact influencing pectin gelation, texture and overall quality of fruit jams and jelly (Garrido et al 2015).

Sensory evaluation: The sensory scores for different samples prepared were given on 9-point hedonic scale. The average scores obtained in sensory evaluation of the jelly samples are graphically represented in Fig 1.

The scores for sweetness, colour and appearance, mouth feel, flavour and the overall acceptability were observed highest for S1 (Jelly with 250 g guava peel and 2.5 g banana peel powder) which was 8 while minimum score was recorded in sample S3 (250 g guava peel and 10 g banana peel powder). The sample S1 was rated highest for flavour (8) because of higher mouth feel than the other jelly samples S0, S2 and S3. The effect of composition of guava and banana peel jelly on mouth feel differed significantly. Sample S3 was rejected in sensory evaluation due to poor setting of jelly, less sugar quantity and slight bitter taste.The control sample (S0) was observed better than samples S2 and S3. Therefore from the sensory evaluation it was revealed that the sample S1 met the desired qualities of jelly with good consistency and taste.

CONCLUSION

Overall acceptance of the sample S1 (Jelly from guava in combination with banana peel powder of 2.5 g) through sensory evaluation was found to be good with a score of 8 as compared to jelly from guava peel (Control sample). Minimum score of 5 for acceptability was awarded to sample S3 (Jelly with

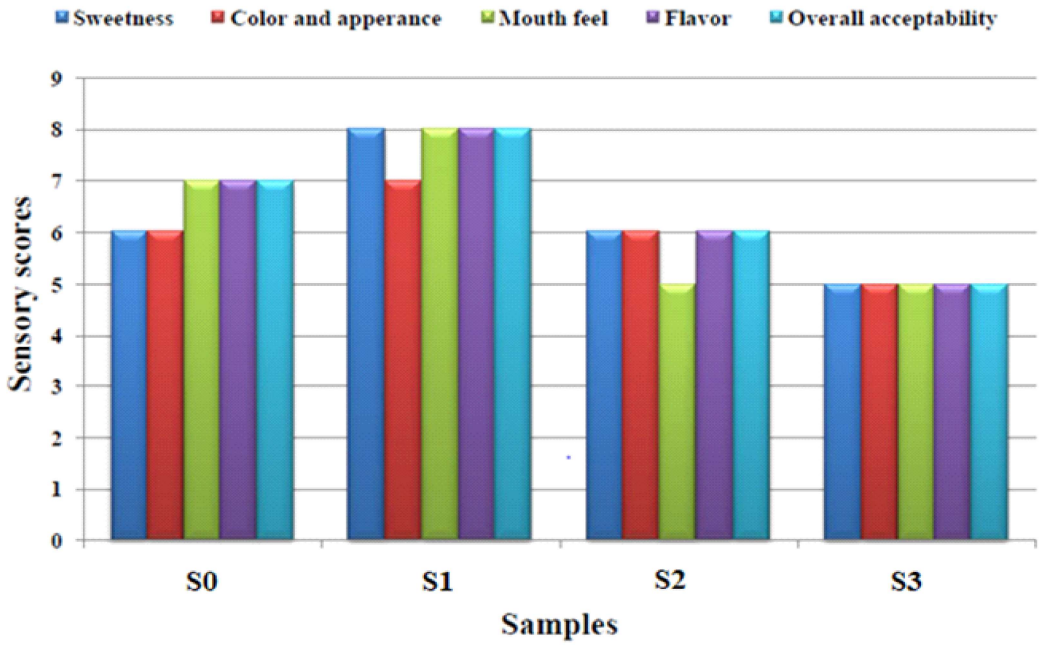

Fig 1. Sensory scores of the prepared jelly

guava peel 250 g and banana peel powder 10 g). From the present study it can be concluded that the jelly prepared from guava peel (250 g) in combination with banana peel powder of 2.5 g was found to be superior to other jelly samples with comparable and better nutritional values, physiochemical attributes and organoleptic properties.

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