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Value addition of *Syzygium cumini* L. (Jamun)

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Abstract

Jamun (*Syzygium cumini* L.) is an evergreen tropical tree belongs to the family Myrtaceae. The world production of Jamun is estimated at 13.5 million tonnes out of which 15.4 per cent is contributed by India. In the world, India ranks second in production of Jamun. Maharashtra state is the largest producer followed by Uttar Pradesh, Tamil Nadu, Gujarat and Assam. Jamun fruit is a good source of iron, vitamin C and other vital nutrients. Post-harvest value addition of Jamun fruit includes preparation of jam, jelly squash and making powder from Jamun seeds which has great medicinal properties for diabetic patients. Two most common value added products jam and squash were prepared from Jamun as part of the study. The TSS of the developed value added products were found to be 67.4 ± 0.4 and 44 ± 0.6 for jam and squash respectively. Hedonic analysis was conducted in order to decide the consumer acceptability of the product developed.

Keywords: Jamun, Post-harvest, *Syzygium cumini* L.

Introduction

Jamun (*Syzygium cumini*) is an evergreen tropical tree in the flowering plant family Myrtaceae, native to Bangladesh, India, Pakistan and Indonesia. It is a rich source of iron (providing 1-2 mg per 100 grams) and vitamin C, and is useful in treating heart and liver ailments. The seed of the Jamun is dried and powdered and is widely used in India to control diabetes (Bukya *et al.*, 2018) [1]. Jamun fruits can be processed into excellent quality products such as vinegar, cider, squash and non-fermented ready to serve beverages. The colour of the Jamun pulp is attributed to the presence of anthocyanin pigment, which is responsible for providing an attractive appearance to the beverages prepared from Jamun. Jamun fruit is also rich source of glucose and fructose which are the major sugars in the ripe fruit besides minerals which provide more calories compared to other fruits. The Jamun seed contains good amount of protein, carbohydrate, calcium, iron, vitamin C, folate, vitamin B, carotene, photo chemicals (purple pigment anthocyanin), magnesium, potassium and fibre. The seeds contain a type of glucose called Jamboline which checks the conversion of starch into sugar in cases of increased production of glucose that is responsible for high sugar levels in human body (Lakshmi *et al.*, 2012) [5].

Table 1: Nutritional composition of *Syzygium cumini* L. (Jamun) / 100 g

Protein	0.7 g
Fat	0.3 g
Minerals	0.4 g
Fiber	0.9 g
Carbohydrates	14 g
Energy	62 kcal
Calcium	15 mg
Phosphorous	15 mg
Vitamin C	18 mg
Sodium	26.2 mg
Potassium	55 mg
carotene	48 mg

A product of 15-20 per cent TSS with mild acid taste. The FPO (1955) specifications for nectar are minimum TSS of 15 per cent, minimum fruit content of 20 per cent. Squash and nectar preparation involves the extraction of fruit juice mixing it with sugar syrup of known strength, addition of citric acid, permitted preservative and finally packing in cans or bottles

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with proper seaming and processing to ensure better storage stability without spoilage (Bhatia *et al.*, 1956). Khurdiya and Roy (1985) [4] reported that juice from Jamun was acidic, astringent and therefore, not generally preferred as such. An attempt was made to prepare a ready to serve (RTS) beverage from Jamun juice having 25% juice, 18% TSS and 0.6% acidity. Jamun fruit juice had an attractive colour and excellent taste with some therapeutic value could be profitably utilized by beverage industry. For preparing of a good quality jam, fruit pulp, sugar, acid and pectin are important ingredients. Jam is a mixture of fruit and sugar cooked to a consistency firm enough to hold the fruit tissues together. Jam can be prepared from practically all fruits and some vegetable may be used singly or in suitable combinations Reddy, 2012; Jellink, 1985 conclude that organoleptic analysis or sensory evaluation is a scientific discipline that analyses and measure human response to the composition of food or product made by the sense of taste, smell, touch and hearing when food is eaten.

Materials and Methods

Various value added products that can be prepared from Jamun include jam, jelly, squash, seed powder etc. Jam and squash were the two product selected for the study.

A) Post-harvest handling and material preparation

Freshly harvested fruit *Syzygium cumini* L. (Jamun) was procured from the local market. It was ensured that the fruits are not infested as that may hamper the quality of product developed. Cleaning operation was performed with Luke warm water in order to partially deactivate the enzymes present.

B) Preparation of Jamun Jam

Jamun jam was prepared by cooking 560 g of sugar with 560 g of Jamun pulp. Citric acid along with sodium benzoate was added as preservatives in order to extend the shelf life of the developed produce. After washing the Jamun fruits were boiled in water (1:1) ratio. This was responsible for softening of the pulp. The cooked Jamun were made into fine pulp by mashing and the seed was removed manually, the pulp was made into fine soft pulp by using mixer grinder. Sugar was added to the fine pulp and cooked it to the consistency of Jam. Finally citric acid and sodium benzoate were added and filled hot in sterilized bottles. The bottles were properly labelled and stored.

Table 2: Process protocol for preparation of Jamun fruit Jam

Step 1	Washing of fruit
Step 2	Boiling with water (1:1) to soften the pulp
Step 3	Preparation of fine pulp
Step 4	Mixing sugar with pulp
Step 5	Cooking to consistency of the Jamun jam
Step 6	Addition of citric acid (0.5g) and sodium benzoate
Step 7	Filling hot into clean and sterilized bottles
Step 8	Sealing the bottle, Labeling and storage

C) Measurement of Total Soluble Solids (TSS)

Degrees Brix (symbol °Bx) is the sugar content of an aqueous solution. One degree Brix is 1 gram of sucrose in 100 grams of solution and represents the strength of the solution as percentage by weight (% w/w) (strictly speaking, by mass). If the solution contains dissolved solids other than pure sucrose,

then the °Bx is only approximate the dissolved solid content. The °Bx is traditionally used in the wine, sugar, fruit juice, and honey industries. Digital refractometer was used for measurement of the TSS. Digital refractometer was held horizontally and pointed towards a light source and it was set to zero brix. The temperature of sample was measured as it should not be more than 30 °C. The reading of the sample was taken. The refractometer was calibrated by placing several drops of sample for accurate reading. After the completion, it was cleaned carefully with a muslin cloth. The temperature correction was added or subtracted from the temperature correction chart.

D) Subjective Hedonic Analysis of developed value added products

Nine point Hedonic test was used to judge the different organoleptic attributes, i.e., appearance, colour, taste, flavour, consistency and overall acceptability of the seven prepared squashes. Organoleptic quality of Jamun jam and squash was determined with the help of a 10 member consumer panel using a 9-point hedonic scale. The attributes evaluated for jam and squash were color, consistency, flavor, aroma, taste and overall acceptability. The average scores of all 10 panelists were computed for different characteristics. The panellists were of age group 18-30 years with no mastication habits and good health. The evaluation was conducted between 10-12 AM.

Table 3: Sensory Evaluation Score card

S. No.	Scale	Characteristics
1	9	Like extremely
2	8	Like very much
3	7	Like moderately
4	6	Like slightly
5	5	Neither like nor dislike
6	4	Dislike slightly
7	3	Dislike moderately
8	2	Dislike very much
9	1	Dislike extremely

Result and Discussion

A) TSS measurement of the developed Jam and Squash

The measured TSS in case of Jamun squash was found to be 16 ± 0.6 degree Brix whereas in case of Jamun jam the measured value for TSS was 67.4 ± 0.4 degree brix. This was found to be suitable for its acceptance and overall quality of the developed product.

B) Hedonic Sensory evaluation of the developed value added products

The taste and flavor of the developed Jamun Jam was found to be highly liked by the panelist. The overall acceptability of the Jamun jam was higher than Jamun squash.

Table 4: Average Hedonic scores of Jamun Jam and Jamun Squash

Attribute	Jam	Squash
Consistency	7.8	7.2
Color	7.5	7.4
Taste	8.2	7.2
Aroma	7.1	6.8
Flavor	8.0	7.4
Overall acceptability	8.0	7.6

The Hedonic evaluation score for jam was 8.0, which implies the range of “like very much” and hence higher acceptability by the subjects. The sensory score for Jamun squash was 7.6 and it implicates a moderate likeness towards the developed product by the subjects.

Conclusion

Jamun fruit jam and Jamun squash were prepared as part of study of value added products of Jamun fruit. The TSS of the developed Jam and Squash were found to be 67.4 ± 0.4 and 44 ± 0.6 respectively. The consumer acceptability of the developed products was also found out using the subjective method of hedonic test with parameters of consistency, aroma, colour, taste and flavor. It was found that the Jamun Jam had higher acceptability compared to the squash with Overall acceptability hedonic scores of 8.0 compared to 7.6 for the squash.

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