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PREPARATION AND SHELF LIFE STUDIES OF *EUGENIA JAMBOLANA* (JAMUN) LEATHER

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Eugenia jambolana (Jamun) leathers were made from jamun pulp with and without jamun seeds using solar with electric drying. Comparative investigation of jamun pulp and its products were conducted in terms of moisture, total soluble solids as degree brix, pH and pectin. Shelf life of the products were monitored for more than six months. Very slight change in color, flavor and texture in two of the products during storage at 15˚C was observed. The Microbiological study revealed the absence of molds and coliforms. The total bacterial counts were 5-15 Cfu/g and 15-50 Cfu/g values for initial and at the end of shelf life, respectively.

Key words: *Eugenia jambolana,* Product, Shelf life, Antidiabetic candy.

Introduction

Eugenia jambolana (Jamun) are small purple plums that have a very sweet flavor, turning slightly astringent on the edges of the pulp, as the fruit becomes mature. These are perishable fruits and are known to be rich in sugar, mineral salts, vitamin C, anthocyanins, flavonoids and other useful ingredients (Suzanne 2003). Fruits seeds are known to have antidiabetic effects (Grover *et al* 2000; Vikrant *et al* 2001). The fruit can be used as an appetizer, antiemetics and antidysentric (Saeed 1972). Despite of these healing properties there seems to be no utilization of fruit in commercial products such as jams, jellies and health drinks.

Keeping in veiw for maximum utilization of jamun fruit and to extend its shelf life, jamun leathers of different composition were formulated. Organoleptic evaluation was also conducted to see the efficacy of the products. These products will capture attraction in local market and abroad due to natural ingredients such as vitamins, minerals, antioxidants and fibers. They are light in weight than their corresponding fresh product and can be available throughout the year despite the fruits' short harvesting period.

Materials and Methods

Fresh jamun fruit was purchased from local market and transported to laboratory under hygienic conditions. Fruit was thoroughly washed under potable water. Pulp was prepared from good quality undamaged fruits with and without having seeds. The two types of pulp were sealed in polythene bags and were stored in freezer for further analysis and preparation of fruit leather.

Prior to preparation of the products, the frozen jamun pulps were defrosted by using microwave oven. Within half an hour at room temperature (25˚C) the fruit pulps were analyzed for moisture, total soluble solids (brix), pH and pectin. Following four types of fruit leather were prepared:

i. Jamun without seeds containing sugar (Jsu).
ii Jamun without seeds containing sorbitol (Jso)
iii. Jamun with seeds containing sorbitol (JSso).
iv. Jamun with seeds containing pectin and sorbitol (JSPso).

The fruit pulps were treated with food grade preservatives under permissible level of FDA and Codex Standards and then heated to inactivate the enzymes and destroy the microorganisms. All the leathers were prepared without addition of color and flavor. Stainless steel trays were used to spread the pulp as 1 / 8 inch thick layer. The product was solar dried during the day and electric oven dry at night to the final moisture level of 15%. The products thus obtained were weighed and then packed in polythene bags and stored at a temperature of 12 - 15˚C.

Sensory evaluation. Sensory quality was evaluated by a panel consisting of ten assessors drawn from the laboratory staff of Food and Marine Resources Research Centre of PCSIR Labs. Complex, Karachi. They were asked to evaluate fruit pulp for appearance, color and flavor, as well as final product for color, flavor, taste, texture, and acceptability on a 9 point score. 9 (extremely good), 8 (very good), 7 (moderately good), 6 (slightly good), 5 (neither good nor poor), 4 (slightly poor), 3 (moderately poor), 2 (very poor), and 1 (extremely poor). The score for each parameter was calculated as the average score awarded by the panel members. An overall quality score was calculated as the mean score of three separate quality parameters. Products were evaluated on monthly basis up to six months of shelf life.

Chemical analyses. Following analyses were conducted on pulps and its products.

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MOISTURE. Samples were dried at 70 ± 5°C till constant weight achieved. Two measurementswere taken for each sample.

SOLUBLE SOLIDS*:* Soluble solids as degree brix was determined according to the AOAC (1980) refractometer method using a temperature compensated refractometer operated at 22 ± 0.5°C. Product's brix was taken on serum of 50% leather solution. Two measurements were taken for each sample.

pH. pH was determined according to Lees (1975) by using electronic pH meter (Fisher Scientific, Accumet 915) at a temperature of 22 ± 0.5°C on a 50 percent sample solution.

PECTIN. Pectin was determined as calcium pectate by using Carre and Haynes method (Ronald *et al* 1991). 25 g sample was boiled with 200 ml water for 1 h. Any loss in water was made up during the boiling. Then the sample solution was transferred to 250 ml volumetric flask and volume was made up with distilled water. It was then filtered in another 250 ml flask and 100 ml aliquot was taken in duplicate. 10 ml 1 N NaOH solution was added with stirring and left overnight. Afterwards 50 ml 1 N acetic acid was added with stirring and 5 min later 25 ml 1 N $CaC1_2$ with stirring added and left for 1 h. Then it was boiled for 1 min. After boiling filtration was carried out using Whatman paper # 41 and the residue was washed with almost boiling water till chloride free. The residue so obtained was dried in an oven at 100 ± 5°C and weighed.

Microbiological analyses. For microbial analyses the product samples were diluted 1:5 in diluent containing 0.1% peptone and 1.0% sodium chloride and stomached for 1min. Subsquently, 10 folds dilution were also made in this diluent. 1ml of each dilution subjected to appropriate tests.

Presence of viable bacteria, yeasts and molds were determined by pour plate method (Anon 1984). The process of coliforms was checked by Lactose broth inoculation.

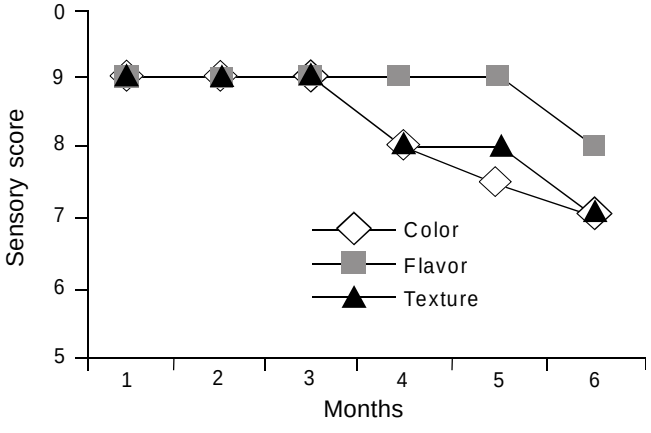

Fig 1. Acceptability characteristics of *Eugenia jambolana* without seeds containing sugar.

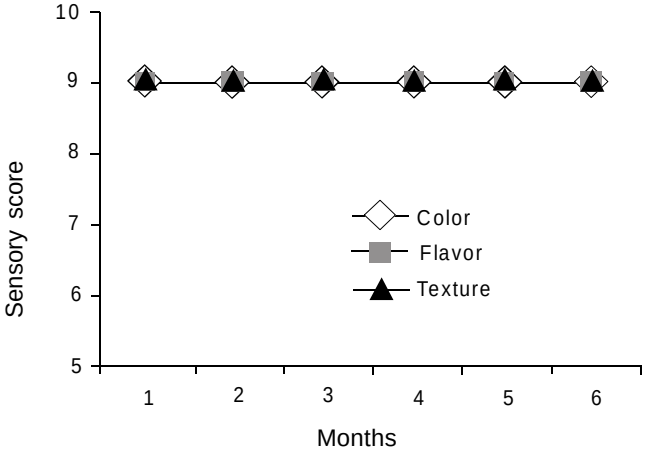

Fig 2. Acceptability characteristics of *Eugenia jambolana* without seeds containing sorbitol.

Results and Discussion

The dehydrated jamun sheets obtained had a uniform texture and cleanly cut to the desired size and shape. The order of acceptability of the products as determined by analysis of the overall acceptability characteristics is given in Figs 1-4. The two products such as JSso and Jso were the most acceptable products in terms of flavor, color and texture. These products had concentrated flavor of the fruit with full natural aroma and color. The texture of these two products was firm and slightly coarse due to the presence of seeds. No bitter taste was observed in these products despite the addition of fruit's seeds. The color, flavor and texture of JSso and Jso remained same throughout 6 months storage. However, the taste panel noted slight off flavor in the jamun leather containing pectin (JSPso). Maskowitz and Arabie (1970) and Marshall and Vaisey (1972) have demonstrated that hydrocolloids not only modify viscosity, but they often reduce intensities of odor, taste and flavor. Therefore, pectin being hydrocolloid may be responsible for the slight off taste. But the texture and color remained same throughout 6 months storage of JSPso. The taste panel noted a slight tough texture, which is due to the addition of pectin. Pectin significantly contributes to the texture of fruits and their processed products such as jams, jellies and yogurt containing fruit bases (Guichard *et al* 1991). Results have shown that jamun fruit and its seeds contain considerable quantity of pectin (Table 1). Jamun pulp with seeds was found to contain 0.380% pectin, which is higher than jamun pulp without seeds having 0.240% that indicates jamun seeds are rich source of pectin (Table 1). The pectin content of the products such as Jsu, Jso, JSso and JSPso were found to be 1.321%, 1.322%, 3.875% and 4.880%, respectively. Jsu scored initially same point in terms of color and texture as Jso

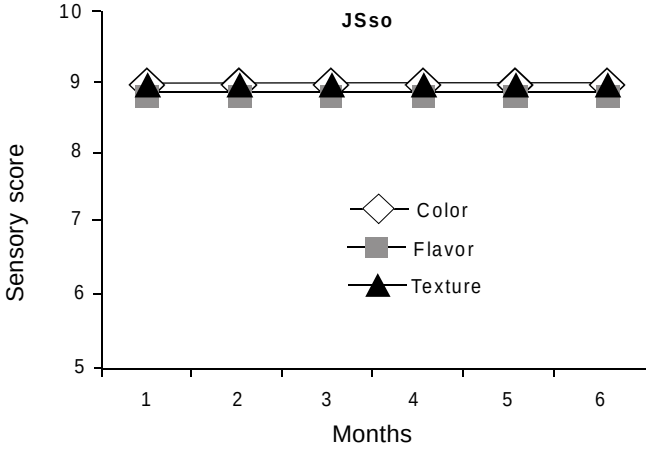

Fig 3. Acceptability characteristics of *Eugenia jambolana* with seeds containing sorbitol.

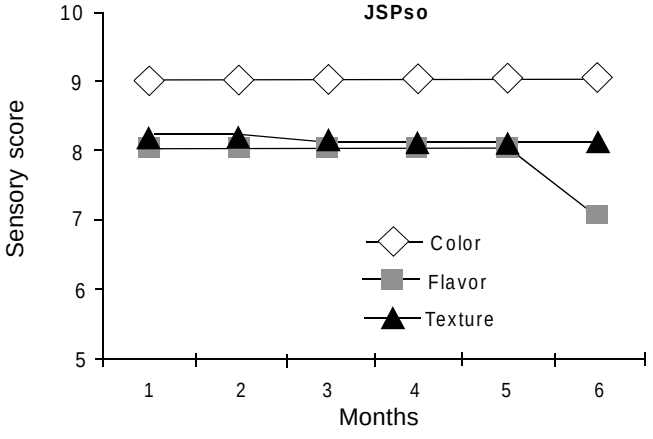

Fig 4. Acceptability characteristics of *Eugenia jambolana* with seeds containing pectin and sorbitol.

but it was sweeter than Jso. After storage of 4 months Jsu became moist due to the hygroscopic nature of sugar thereby decreasing its acceptability level by the taste panel. The sorbitol containing leathers had a drier appearance, as sorbitol is a humectant. The jamun leathers with jamun seeds had coarse texture while those of jamun leathers without seeds were soft.

The brix of pure jamun fruit pulp (J) was found to be 12 that was adjusted to 27.5 for Jso and JSso, 27.0 for JSPso and 32.0 for Jsu. The initial moisture of these four products was controlled around 15%. This moisture level causes bacterial and yeast growth to cease (Davies *et al* 1976). The pH of both types of fruit pulp was found to be 3.6. However, all the four types of leathers had a pH value of 3.5 that is due to the addition of antioxidants and preservatives during processing. Lower pH is also one of the factors that increase the shelf life of these products (Dauthy 1995). Initial bacterial counts of all sample were ranged from 5 - 15 Cfu/g for total aerobic count and nil value for molds count. In all samples no significant

Table 1
Chemical analyses of Jamun pulp

Product	pH	Moisture %	Brix (before drying)	Pectin % (As Calcium pectate)
J	3.6	85	9.0	0.240
JS	3.6	83	12.0	0.380
Jsu	3.5	15.0	32.0	1.321
Jso	3.5	15.0	27.5	1.322
JSso	3.5	15.0	27.5	3.875
JSPso	3.5	15.0	27.0	4.880

J: Jamun pulp without seeds, JS: jamun pulp with seeds, Jsu: jamun pulp without seeds containing sugar, Jso: Jamun pulp without seeds containing sorbitol, JSso: Jamun pulp with seeds containing sorbitol, JSPso: Jamun pulp with seeds containing pectin and sorbitol

increase was observed in bacterial count over a 6-12 months period. Results shows value 15 - 20 Cfu/g for aerobic count and nil mold count/g at the end of shelf life.

It can be concluded from this study that jamun leather can be successively prepared. Sensory evaluation and shelf life studies show that jamun can be enjoyed throught the year in the form of leather and is a possible snack food for diabetic patients owing to the antidiabetic activity of jamun's seeds. However, nutritional evaluation and antidiabetic activity of jamun leather has to be carried out which is beyond the scope of our present study.

References

AOAC1980 *Official Methods of Analysis.* Association of Official Analytical Chemists, Washington, DC. 13th ed.

Anon 1984 *Bacteriological Analytical Manual*, FDA, 6th ed.

Dauthy M E 1995 *Fruit and Vegetable Processing.* FAO Agricultural Services Bulletin No. 119.

Davies R, Birch G G, Parker K J 1976 *Intermediate Moisture Foods.* Applied Science Publishers Ltd.

Grover J K, Vats V, Rathi S S 2000 Antihyperglycemic effect of *Eugenia jambolana* and *Tinospora cordifolia* in experimental diabetes and their effects on key metabolic enzymes involved in carbohydrate metabolism. *J Ethnopharmacol* **73** (3) 461-470.

Guichard E, Issanchou S, Etievant P 1991 Pectin concentration, molecular weight and degree of esterification: Influence on volatile composition and sensory characteristics of strawberry jam. *Journal of Food Science* **56** (6) 1621-1627.

Saeed H M 1972 Hamdard Pharmacopeia of Eastern Medicine, Published by Hamdard National Foundation, Pakistan.

Hui Y H 1991 *Encyclopedia of Food Science and Technology* Wiley-Interscience Publication. John Wiley & Sons, Vol 3.

Lee R 1975 *Food Analysis: Analytical and Quality Control Methods for the Food Manufacturer and Buyer,* Leonard Hill Books, 3rd ed.

Marshall S, Vaisey M 1972 Sweetness perception in relation to some textural characteristics of hydrocolloids gels. *J Texture Studies* **3** 173.

Maskowitz H R, Arabie P 1970 Taste intensity as a function of stimulus concentration and solvent viscosity. *J Texture Studies* **1** 502.

Owen R 1985 *Food Chemistry,* Marcel Dekker, Inc. 2nd ed.

Ronald S K, Sawyer R 1991 *Pearson's Composition and Analysis of Foods.* Longman Scientific and Technical Publication, 9th ed.

Suzanne Urverg - Ratsimamanga 2003 *www.ecdu.net.cn / events / innovative 07.*

Vikrant V, Grover J K, Gupta N 2001 Treatment with extracts of *Momordica charantia* and *Eugenia jambolana* prevents hyperglycemia and hyperinsulinemia in fructose - fed rats. *J Ethnopharmacol* **76** (2) 139 -143.