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VALUE ADDITION AND STORABILITY OF DIFFERENT JAMUN-MANGO BLENDS

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ABSTRACT
An experiment was carried out to study the value addition of blended jamun-mango juice. Jamun and mango juices were blended in the ratio of T_1(100:00 jamun: mango), T_2(90:10:: jamun: mango), T_3(80:20:: jamun: mango), T_4(70:30:: jamun: mango) and T_5(60:40:: jamun: mango) for the preparation of ready- to- serve beverages. During six months of storage, the pH, reducing and total sugar contents of jamun mango blended ready to serve beverage of different treatments increased while phosphorus and tannin content decreased, respectively. The analysis of ready to serve beverage reveled that T_5(60:40:: jamun: mango) recorded the highest phosphorus (4.41 mg/100g), reducing (7.06 percent) and total sugar contents of 11.43 percent. Treatment T_3(80:20 ::jamun: mango) was adjudged the best for retaining the maximum tannin and phosphorus contents even after 6 months of storage. All the samples were found to be free from microbial count upto four months of storage. However after six months of storage only treatments T_4(70:30:: jamun: mango) and T_5(60:40:: jamun: mango) showed a negligible count of 1×10^6 (CFU/ml) which might have occurred during handling etc and was in safe zone.

INTRODUCTION

Value addition to food products has assumed vital importance in our country due to diversity in socio-economic conditions, individual growth, urbanization and globalization. It is not merely to satisfy producers and processors by way of higher monitory returns but also with better taste and nutrition. Value is added to increase the shelf life of perishables. Still there is need to discuss and improve the quality of value added food products for domestic market as well as for export (Anonymous, 2005).

Fruit beverages have higher nutritional and medicinal values compared to synthetic beverages and these can be improved further by blending juice of two or more juices having nutritive and therapeutic values. Blending of fruit juices helps in improving nutrient elements, reducing cost of production by using cheaper fruits in the blends and also leads to new product development (Kalra *et al*., 1991). Moreover, fruits which are rich in nutrients but not acceptable due to high acidity or poor taste and flavour can be blended with other fruits to improve their acceptability and make use of available nutrients. Some consumer avoid taking jamun fruit because of astringent taste but prefer it if suitable fruit products are prepared from this fruit. Hence, the study was conducted with the objective to: (1) Develop value added products from jamun-mango blends. (2) Study storability of the finished product.

MATERIALS AND METHODS

Both jamun (*Syzigium cumini* Linn) and mango(cv.Dashehari) fruits were transported to the pilot plant of the Division of Food Science, Sher-e-Kashmir University of Agricultural Sciences and Technology, Udheywalla, Jammu during the year 2010-11 and 2011-12 for further processing. The defective and injured fruits of jamun and mango were sorted out and healthy ones were retained for juice extraction after washing with water. The juice so obtained was passed through stainless steel strainer, homogenized followed by heating at 85 ºC for 30 second and filling in pre-sterilized glass bottles. Bottles were crown corked and pasteurized for 20 min in boiling water, cooled, labeled and stored at ambient temperature for further use. The juice so obtained was also analyzed for physico-chemical. The jamun and mango juices were blended in different combinations of sample for estimating quality attributes such as 100:00; 90:10; 80:20; 70:30 and 60:40 for developing of ready-to-serve beverage. As per the method given by Kumar and Manimegalai (2008). Total soluble solids and acidity of the beverage was adjusted to 15ºBrix and 0.3 percent by using sugar and citric acid and then heat pasteurized at 85 ºC for 30 seconds followed by immediate cooling to room temperature and preservation with 200 ppm of sodium benzoate respectively. The beverage was then filled in pre-sterilized glass bottles of 200ml capacity, crown corked and pasteurized for 30 minutes in boiling water followed by immediate cooling labeling and storing. The ready-to-serve beverages prepared were stored at room temperature (30-42 ºC) for periodical analysis after 0, 2, 4 and 6 months for physico-chemical (Ranganna, 2008).

Physico-chemical analysis

pH

The pH was determined by using pH meter calibrated with a standard buffer solution of pH as described by AOAC (2002).

Sugars

Lane and Eynon's volumetric method as detailed by Ranganna (1986) was followed.

Reducing sugars

Measured quantity of sample (20 g) was taken in 250 ml volumetric flask to which about 100 ml distilled water was added and neutralized with 40 per cent sodium hydroxide using phenolphthalein as indicator and clarified with 2 ml of 45 per cent neutral lead acetate for about 30 minutes. Excess of lead was removed by adding 5 ml of 22 per cent potassium oxalate. The volume was made to 250 ml and filtered through Whatman no. 4 filter paper. The filtrate was titrated against 10 ml of standardized Fehling's solution using methylene blue as indicator to a brick red precipitate, for determination of reducing sugars.

Total sugars

A measured aliquot (100 ml) of the above filtrate was taken in 250 ml volumetric flask and was hydrolyzed by adding 10 ml of 50 per cent hydrochloric acid, kept overnight for 24 hours at room temperature followed by neutralization with 40 per cent sodium hydroxide using phenolphthalein as indicator. The volume was made to 250 ml and titrated against Fehling's solution, as above, for total sugars and expressed as percent total sugar.

Tannin

Colorimetric method of Folin – Denis was followed for estimating tannins as per the procedure described by Ranganna (1986). A known quality of sample (5ml/gm) was taken into 100 ml of volumetric flask containing 75 ml distilled water. To this 5ml of Folin - Denis reagent and saturated sodium carbonate (10ml) were added and volume was made to 100 ml with distilled water. The contents were shaken well and allowed to stand undisturbed for colour development for 30 minutes and filtered through Whatman filter paper no. 4. The colour absorbance of the filtrate was recorded at 760nm using UV- spectrophotometer. A standard curve was plotted by taking known amounts of tannic acid solution as reference slandered. Results were expressed as mg /100g tannic acid.

Phosphorus

Phosphorus content was estimated with the help of spectrophotometer (UV-1601) by using Vandate – molybedate reagent yellow colour method given by Singh *et al*., 1999. A known quantity (5ml) of pre-digested aliquot was taken in 25 ml volumetric flasks to which 5 ml vandate - molybdate reagent was added and volume was made to 25 ml with double distilled water. After 30 minutes. the absorbance was recorded at 420 nm. The phosphorus content was calculated by plotting against the standard curve obtained by taking known amount of potassium dehydrogen phosphate (KH_2PO_4) salt. Results were expressed as mg/100g.

Statistical Analysis

The data obtained was analyzed statistically (Gomez and Gomez, 1984) using Completely Randomized Design (CRD) and CRD factorial for interpretation of results though analysis of variance.

RESULTS AND DISCUSSION

All the treatments showed a significant increase in pH of jamun-mango blended ready to serve beverage during storage (Table 1). The possible reason for the increase in pH during storage might be due to the decrease in titratable acidity. The other possible reason for increase in pH might be due to loss of H^+ ions concentration as a result of decrease in acidity during storage. These results are in agreement with the findings of Nagpal and Rajyalakshmi (2009) while studying chemical characteristics of bael and citrus ready to serve beverage during six month of storage.

Both reducing and total sugar contents of jamun mango blended ready to serve beverage increased significantly with the increase in storage period which might be due to hydrolysis of polysaccharides into simple sugars. Maximum

Table 1 : Effect of treatments on physico chemical changes of jamun- mango blended ready-to-serve (RTS) beverage during storage

Treatment	Storage period (months)	pH	Reducing sugars (%)	Total sugars (%)	Tannins (mg/100g)	Phosphorus (mg/100g)
T_1(100:00:: Jamun:Mango)	0	3.09	4.65	8.64	51.94	4.24
	2	3.09	5.72	9.13	51.92	4.22
	4	3.11	6.05	9.95	51.90	4.18
	6	3.12	6.83	10.63	51.86	4.16
T_2(90:10:: Jamun: Mango)	0	3.11	4.84	9.08	51.24	4.30
	2	3.12	5.66	9.75	51.22	4.28
	4	3.12	6.23	10.10	51.20	4.24
	6	3.14	7.23	10.94	51.18	4.21
T_3(80:20:: Jamun: Mango)	0	3.10	4.92	8.83	51.14	4.38
	2	3.10	5.49	9.95	51.14	4.36
	4	3.11	6.27	10.63	51.13	4.35
	6	3.12	6.64	10.75	51.12	4.35
T_4(70:30:: Jamun: Mango)	0	3.11	5.04	9.27	51.04	4.44
	2	3.12	5.64	10.06	51.02	4.42
	4	3.13	6.21	10.89	51.00	4.38
	6	3.14	6.96	11.24	50.96	4.35
T_5(60:40:: Jamun: Mango)	0	3.12	5.16	9.98	50.94	4.52
	2	3.14	6.07	10.23	50.90	4.48
	4	3.14	6.63	10.93	50.88	4.43
	6	3.15	7.06	11.43	50.83	4.41

Table 2 : Total microbial count of jamun- mango blended ready-to- serve (RTS) beverage during storage.

Treatment	Total number of colonies (cfu/ml) Storage period (months)			
	0	2	4	6
T_1(100:0::Jamun:Mango)	0	0	0	0
T_2(90:10::Jamun:Mango)	0	0	0	0
T_3(80:20::Jamun: mango)	0	0	0	0
T_4(70:30::Jamun:Mango)	0	0	0	1×10^6
T_5(60:40::Jamun:Mango)	0	0	0	1×10^6

reducing and total sugar contents of 7.06 and 11.43 per cent were recorded in the treatment T_5(60:40::Jamun: Mango). While working on Bael – guava ready to serve beverage and bael- aloe vera ready to serve, Nidhi *et al*. (2008) and Tiwari and Deen (2015) observed an increase in sugars during storage.

Highest tannin contents (51.86 mg/100g) was found in T_1(100:0:: jamun:mango) after six months of storage. Tannin contents of different treatments decreased through out the storage period (Table- 1). Similar trend have also been reported by Nidhi *et al*. (2008) in bael-guava blended ready-to-serve beverage which was possibly due to the oxidation of tannins during storage.. The highest phosphorus content of 4.41 mg/ 100g was recorded in T_5(60:40:: jamun:mango) whereas the lowest phosphorus of 4.16 mg/100g was recorded in T_1(100:0:: jamun:mango) after six months of storage. During storage period phosphorus shows decline trend in all the treatments. Similar finding of decline in phosphorus content have been reported by Sharma *et al*. (2008) in guava-papaya blended ready-to-serve beverage.

Microbial studies of Jamun- mango blended ready-to-serve beverage.

All the samples were found to be free from microbial count upto four months of storage (table-2). However after six months of storage only treatments T_4(70:30:: jamun: mango) and T_5(60:40:: jamun: mango) showed a negligible count of 1×10^6 (CFU/ml) which might have occurred during handling etc and was in safe zone. Similarly, Polshettiwar *et al*., 2008 found the presence of microbial count in some of the samples of chyawanprash due to genera Bacillus as a common contaminant which may be from air on the other hand Garcia *et al*. (1995) did not observe any microbial growth in the product sealed properly in glass jar after 1 month of storage.

Cost of production

Cost of production of jamun- mango blended ready-to-serve beverage was based upon the fixed and variable cost. The fixed cost includes the overall changes, machinery depreciation, labels, fuel and variable cost comprises of raw materials which includes fruits and all other ingredients, cost of glass jars, corks etc. value added tax and a reasonable profit margin. The cost of production of jamun- mango blended ready-to-serve beverage comes to Rs 7.65/250ml which were much less as compared to market brands.

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