

Product development acceptability and cost effectiveness of jack fruit jam blended with avocado and kokum

G. KUSHALA, K.N. SREENIVAS AND R. SIDDAPPA

Jack fruit (*Artocarpus heterophyllus* L.) is largest edible fruit in the plant kingdom, research was carried out to study the effect of blending jack fruit jam, jack fruit (65%), avocado (15%) and kokum (20%). In various proportions an effort was made to improve its quality and sensory evaluation. Results showed that the Jack fruit jam blended with avocado and kokum containing 55 per cent juice, 0.5 per cent of acidity and 70° Brix was found to be acceptable with good organoleptic scores for appearance (4.12), aroma and flavour (4.33), taste (4.27) and overall acceptability (4.09). Product was free from spoilage during 120 days of storage, the benefit cost ratio of the product was 3.53:1. Hence, commercial production of the products can be taken up and promoted as a small scale income generating activity.

How to cite this article : Kushala, G., Sreenivas K.N. and Siddappa, R. (2012). Product development acceptability and cost effectiveness of jack fruit jam blended with avocado and kokum. *Food Sci. Res. J.*, 3(1): 78-80.

Key Words : Acceptability, Cost effectiveness, Jack fruit jam

INTRODUCTION

Jack fruit (*Artocarpus heterophyllus* L.) is one of the underutilized fruits, belongs to family Moraceae. It is popularly known as “poor man’s food”. The ripe jack fruit bulbs are rich in sugars with a calorific value of about 90 calories per 100 g fresh weight. Jack fruit is nutritious, rich in vitamins (A and B), minerals (Ca, K and Fe) and contains considerable amounts of carotene and vitamin-C. It is an important source of pectin and protein (Anonymous, 2000). Fruit is a highly fibrous and has nutritive value, containing 18.9 g carbohydrates, 0.8 g minerals, 30 IU vitamin-A and 0.25 mg thiamine for every hundred grams (Sammaddar, 1985). Jack fruit is being valued by the processor to make the best use of enormous production and glut in the market during the season.

The research on the utilization of jack fruits blended and value added products are very scanty. Blending becomes the one of the way of utilization of more number of fruits for high quality in respect of both sensory and nutritional aspects. Keeping in view the above facts and in order to explore the possibility of preparing the processed and value added products from jack fruit hygienically, the present study was undertaken with the following objectives: to standardize the recipes for preparation of product of jack fruit jam blended with avocado and kokum, to study organoleptic evaluation of prepared products for quality and acceptability and to study the cost of economics of the prepared product.

METHODOLOGY

The research was carried out at the Undergraduate Processing Laboratory at the Department of Horticulture, Gandhi Krishi Vigyan Kendra, University of Agricultural Sciences, Bangalore.

Preparation of blended juice:

For the extraction of jack fruit juice, outer rind was removed using stainless steel knife and bulbs were cut into small pieces. Fresh pulp was separated and filtered with the help of muslin

MEMBERS OF RESEARCH FORUM

Address for correspondence :

G. KUSHALA, Krishi Vigyan Kendra, Hiriyyur, CHITRADURGA (KARNATAKA) INDIA

E-mail: kushi718@gmail.com

Associate Authors :

K.N. SREENIVAS, Department of Post Harvest Technology, University of Agricultural Sciences, G.K.V.K., BENGALURU (KARNATAKA) INDIA

R. SIDDAPPA, Department of Horticulture, K.R.C. College of Horticulture, ARABHAVI (KARNATAKA) INDIA

Table A: Details of treatments

Treatments	Juice (%)	Juice ratio (%)			TSS ^o B	Acidity (%)
		Jackfruit	Avocado	Kokum		
J ₁ T ₁	50	65	15	20	65	0.5
J ₁ T ₂	50	65	15	20	70	0.5
J ₂ T ₁	55	65	15	20	65	0.5
J ₂ T ₂	55	65	15	20	70	0.5

Design : Factorial CRD

Number of replications : 4

Number of treatments : 4

cloth.

Juice from avocado was obtained, Kokum fruits were, first, washed with water and then, the fleshy pulp was separated from the rind. The FPO minimum specification for jam is as follows:

The blended juice, to be used for the preparation of products, was prepared by mixing jack fruit, avocado and kokum juice in the ratio of 65:15:20.

For jam minimum percentage of fruit juice/pulp 50 minimum percentage TSS 68° Brix and acidity percentage 0.5,

Recipes were prepared with 50 and 55 per cent and TSS 65 and 70° Brix and 0.5 per cent acidity.

Table B. Sensory evaluation of jack fruit jam blended with avocado and kokum

Appearance/colour	Aroma and flavour	Taste	Overall acceptability	Scores
Best	Extremely pleasant	Best	Extremely acceptable	5
Very much attractive	Very much pleasant	Better	Highly acceptable	4
Acceptable attractiveness	Pleasant	Good	Acceptable	3
Moderately attractive	Moderately pleasant	Ok	Moderately acceptable	2
Slightly attractive	Slightly pleasant	Bad	Slight acceptable	1
Not attractive	Not pleasant	Very bad	Not acceptable	0

Note: Hedonic rating scale

Scores 0-5

Preparation of products:*Jack fruit jam blended with avocado and kokum:*

Jack fruit jam having 4 different compositions (pulp 50 to 55 %, TSS 65 to 70° Brix) with a fixed level of acidity (0.5 %) was prepared. The required quantity of pulp and sugar as per the recipe were taken in a steel vessel and heated over a gas stove with continuous stirring of the mixture separately. Citric acid was dissolved in little water and pulp. Heating was continued

until the required (TSS was estimated with the help of hand refractometer) the boiling was continued till the mixture set into clear jam as tested by flow sheet test. The jam was filled into clean, sterilized jam bottles, covered with butter paper, sealed hermetically and stored at ambient condition for making further observations.

The TSS was measured by using Erma-hand refractometer, titrable acidity was estimated by using Ranganna, (1977) and Somogyi (1945) method, respectively. Organoleptic evaluation of the product was done by a panel of 20 judges by numerical scoring method (Amerine *et al.*, 1965).

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation have been presented under following heads :

Studying the economics of prepared products:

Cost involved in the preparation of products was calculated after choosing the best treatment and total revenue was also estimated. Net revenue was calculated by following formulae.

$$\text{Net revenue} = \text{Total revenue} - \text{Total cost}$$

Jack fruit jam blended with avocado and kokum:*Appearance:*

Appearance of blended jam was influenced by high levels of pulp and sugars interaction *i.e.*, 55 per cent pulp and TSS 70°B (J₂T₂) (Table 1). This might be due to higher pulp levels of Jack fruit, avocado and kokum (65:15:20) which might have imparted better eye appeal and 70°B sugar level gives good viscosity to the blended jam. Harshavardhan Reddy, 2004 observed similar results in aonla jam.

Aroma and flavour:

Aroma and flavour of blended jam was influenced by levels of pulp and sugars interaction *i.e.*, 55 per cent pulp and TSS 70°B (J₂T₂) scored highest (Table 1). This might be due to higher pulp levels, which imparted better aroma and flavour, the findings, are in agreement with findings of Bhatnagar (1991) in watermelon rind jam.

Taste:

55 per cent pulp and TSS 70°B (J₂T₂) was having acceptable taste among all the recipes in the blended jam (Table 1). Appropriate combination of pulp and sugar at suitable levels might have contributed higher score for the blended jam, Singh and Kumar (1995) reported that aonla jam prepared with 45 per cent pulp, 68 per cent TSS and 1 per cent acidity got highest organoleptic score.

Overall acceptability:

In Table 1 the highest score of 4.09 for over all acceptability

Table 1. Organoleptic scores jack fruit jam blended with avocado and kokum during storage

Factors	Appearance	Aroma and flavour	Taste	Over all acceptability
Interaction				
J ₁ T ₁	3.87	3.33	3.75	3.60
J ₁ T ₂	3.85	3.22	3.85	3.87
J ₂ T ₁	4.02	3.91	3.97	4.02
J ₂ T ₂	4.12	4.33	4.27	4.09
F-test	*	*	*	*
S.E. ±	0.0041	0.0041	0.004	0.004
C.D. (P=0.05)	0.0126	0.0126	0.0132	0.0126

* indicates significance of value at P=0.05 NS = Non-significant

was observed for the 55 per cent pulp and TSS 70^oB (J₂T₂). This might be due to better consistency, acceptable colour, taste and sugar acid blend at this level, Kaushik *et al.* (2002) made similar observation in bael jam.

Microbial spoilage:

During processing aseptic methods were followed for handling the products, bottles used for storing products were pre-sterilised and dried properly before filling the products, Therefore, there was no visible spoilage of products during storage, the findings are in agreement with findings of Giridharilal *et al.* (1986).

Economics of jack fruit jam blended with avocado and kokum:

Benefit cost ratio of blended jack fruit jam was 3.53:1 (Table 1) and it was due to highly concentrated nature of the product and fetched the highest price among all the product. It was more than the benefit cost ratio of pummelo-sweet orange (50:50) ready to serve beverage in which benefit cost ratio of

Table 2. Jack fruit jam blended with avocado and kokum

Materials	Quantity	Amount (Rupees)
Jack fruit (g)	1144	5.72
Avocado (g)	264	9.24
Kokum (g)	352	3.52
Sugar (g)	2240	40.32
Citric acid (g)	16	1.5
Bottles and corks	16	40
Miscellaneous	-	13

Total cost 113.3
 113.3 + 22.66 Rs (Labour charge) = 135.96
 Total quantity of production = 3.2 kg
 Cost of production = 42.48 litre
 Number of bottles = 16
 16 x 30 = 480
 Net revenue = Total revenue – Total cost
 480 – 135.96 = 344.0 Rs
 Benefit – cost ratio = 3.53:1

1.58:1 was achieved (Navya, 2006). It was due to low cost of fruits and more juice recovery percentage of jack fruit (42 %).

Conclusion:

Jam prepared with 55 per cent pulp, 70^oB and 0.5 per cent acidity was found to be the best recipe for quality attributes like appearance, aroma, flavour and overall acceptability through organoleptic evaluation. No spoilage was noticed during storage.

Benefit cost ratio of all the prepared products was above 1, hence commercial production of the products can be taken up.

Though jack fruit is the minor crop but available in plenty during the season, these products showed high sensory acceptance and cost economic, so these products can be prepared commercially.

LITERATURE CITED

Amerine, M.D., Pangborn, R.M. and Roesster, E.B. (1965). *Principles of sensory evaluation of foods*, Academic press, LONDON.

Anonymous (2000). Jack fruit processing-fruitful SSI venture. *Indian Food Ind.*, **19**: 323.

Bhatnagar, D.K. (1991). Utilization of watermelon rind for jam making. *Indian Food Packer*, **45**(1): 46-48.

Giridharilal, Siddappa, G.S. and Tandon (1986). *Preservation of fruits and vegetables*. Revised edition, Indian Council of Agricultural Research Publication, NEW DELHI, pp. 69-80.

Reddy, Harchavardhan (2004). Development of value added products from aonla (*Emblica officinalis* L.). M.Sc. Thesis, University of Agricultural Sciences, BENGALURU KARNATAKA (India).

Kaushik, H.L., Yamdagni, R. and Sharma, J.R. (2002). Changes in quality parameters during processing and storage of processed bale fruit. *Indian Food Packer*, **59**(1): 71-77.

Navya Yadav, P. (2006). Development of a rind peeler for pomelo (*Citrus grandis*) and development of value added products from pomelo fruit. M. Tech. Thesis, University of Agricultural Sciences, BENGALURU, KARNATAKA (India).

Ranganna (1977). *Manual of analysis of fruit and vegetable products*, 2nd Edn. Tata Mc Graw-Hill publishing company Ltd., NEW DELHI (India).

Sammaddar, H.N. (1985). Jack fruit. In T.k. Bose (Ed.), *Fruits of India: Tropical and subtropical*, Calcutta: Naya Prohash. pp. 487-497.

Singh, I.S. and Kumar, Sanjeev (1995). Studies on processing of aonla products. *Prog. Hort.*, **27**(1-2): 39-47.

Somogni, M. (1945). Estimation of reducing sugars. *J. Biol. Chem.*, pp. 160-161.

Received : 19.01.2012; Revised: 15.02.2012; Accepted : 15.03.2012