

**RESEARCH ARTICLE :**

# Agro-based minor fruits value addition for up-gradation by quality assessment and acceptance through hedonic scores of organoleptic attributes

■ Mamta Tiwari and Gunjan Sanadya

**ARTICLE CHRONICLE :****Received :**

22.11.2017;

**Revised :**

25.12.2017;

**Accepted :**

11.01.2018

**KEY WORDS :**

Minor fruits, Hedonic test, Organoleptic, Attributes, Jam, Squash, Candy, Jelly

**Author for correspondence :****Mamta Tiwari**

Directorate of  
Prioritization  
Monitoring and  
Evaluation, Agriculture  
University, Kota  
(Rajasthan) India

See end of the article for  
authors' affiliations

**SUMMARY :** India is the second largest producer of fruits and vegetables in the world. The total production of fruits and vegetables is 81.285 and 162.186 million tonnes, respectively during 2012 – 2013. India's 70 per cent of population are engaged only in production activities of Agriculture, we need more and more entities and systems to add value. Along with this minor fruits up gradation is also very much require through value addition for nutrition up-liftment among people as well as economic benefit to family. In doing so, we need to look at food wastages and their prevention, improvement in value addition of horticultural produces through adoptable processes, harnessing untapped food resources, utilizing by-products and assuring food quality and safety. All these have to be interlinked with extension of shelf life, which is also value addition. Though India is producing various kinds of major and minor fruits but hardly 2.2 per cent of the production is commercially processed whereas more than 50 per cent of the produce is processed in developed countries (Rasul, 2001). However, the level of processing in the major fruit producing countries are Brazil- 70 per cent, USA –60-70 per cent, Malaysia –83 per cent and Israel –50 per cent. International trade in processed fruit products is around US \$ 9200 million. The present study was conducted with the aim to increase the use of minor agro produce in processing and to reduce the waste, in which minor fruit Jams, Jally, Murabba, Candy products were formulated incorporating fruit pulp. Prepared five different products subjected to two groups and their organoleptic attributes were assessed. Nine (9) point Hedonic rating scale was used for organoleptic analysis of minor fruit products. Each group had 30 panel members. Results revealed that various organoleptic attributes, *i.e.* app., colour, taste, flavour, consistency and overall acceptability of all six jams obtained  $\geq 7$  hedonic scores by both groups indicating that the jams were liked moderately to very much by them. The taste, flavour and acceptability of these jams and murabba were very good. These jams were acceptable among both the study groups. Thus, it can be concluded that these products can be used as spreads and one can consume them with bread, chapati or parantha and refresh himself/ herself with the tasty and tangy flavours of fresh fruits.

**How to cite this article :** Tiwari, Mamta and Sanadya, Gunjan (2018). Agro-based minor fruits value addition for up-gradation by quality assessment and acceptance through hedonic scores of organoleptic attributes. *Agric. Update*, 13(1): 67-71; DOI: 10.15740/HAS/AU/13.1/67-71.

**BACKGROUND AND OBJECTIVES**

India is the second largest producer of

fruits and vegetables in the world. The total production of fruits and vegetables is 81.285

and 162.186 million tones, respectively during 2012–2013 in India. Though India is producing various kinds of major and minor fruits but hardly 2.2 per cent of the production is commercially processed whereas more than 50 per cent of the produce is processed in developed countries (Rasul, 2001).

Minor fruits are sometimes very nutritive and have its importance. They are said to be minor/under exploited mainly due to lack of planting materials, lack of intervention on production system and fitness with existing farming system, lack of information on post harvest management, processing and value added product, lack of information on access to market, lack of national policy though they have high nutritional and medicinal values. In order to improve the social and nutritional status of the people and also to make a dent in export promotion, it is worthwhile to increase the manufacture of high quality, delicious and variable processed products from under exploited fruits in the present day value addition programme. North East India is endowed with diverse climatic conditions, which are capable of producing different minor fruit crops as a orphan way as well as organic. In spite of enormous nutritive and medicinal values, the cultivation of minor/underutilized fruit crop is restricted, as a result of this they are not available in plenty and a large number of them are unknown in the world market. There is always demand from consumers all over the world for new food products, nutritious and also delicately flavoured and attractively coloured. Under these circumstances, the processed product has been formulated to develop value added products from some of the underutilized crops like jamun, pumpkin, karonda, falsa and jackfruit which are highly perishable and impossible to keep them for more than 24 hours under ambient condition e.g., jamun; some of them are not easy to eat out of hand. The seasonal nature with short storage life even under low temperature condition, necessitate processing of the jackfruit.

Jamun (*Syzygium cuminii*) belongs to the family Myrtaceae. It is indigenous to India. The refreshing and curative properties of jamun make it one of the useful medicinal plants of India. Fruits are a good source of iron, an effective medicine against diabetes, heart and liver trouble. The ripe fruit can be processed as soft beverages and also fermented one. A good quality jam, jelly and pickle can also prepare from this fruit. A method of extraction of the jamun juice has been standardized

(Shukla *et al.*, 1991). Jamun juice mixed with mango juice is very effective for quenching thirst for diabetic patients. Its juice being highly acidic in nature is not consumed as such but juice is stoma chic, carminative and diuretic apart from having cooling and digestive properties. Procedure of extraction of any ripe fruit juice is washing, crushing with addition of water (if require with continuous heating at 70°C for some fruits) and straining. Procedure of R.T.S. preparation is pulp/juice (Heated upto 70 % + sugar +water+ acid/preservative +colour +essence. According to recipe, Homogenization, Bottling, Crown, Corking, Pasteurization (at about 90° C) For 25 minutes, cooling, storage. Similarly preparation of syrup solution is (sugar +water+ acid, heated just to dissolve), Straining, Mixing with Juice, Addition of preservative (0.6g KMS or 1.0g sodium benzoate/litre squash), Bottling and capping, storage.

#### **Value addition in jamun, jackfruit, karonda, falsa and beel :**

A method of extraction of the jamun juice has been standardized (Shukla *et al.*, 1991). It has been found that the maximum yield of jamun juice with a high level of the anthocyanin and other soluble constituents was obtained by grating the fruit, heating upto 70°C and passing the heated mass through basket press (Ramanjaneya, 1985). The jackfruit puree was prepared by adding water to the fruit in ratio of 3:1 following by passing through a pulper. The resulting puree was then mechanically pressed to obtain the juice (Seow and Shanmugam, 1992). Prasad and Mali (2000) reported that after the extraction, juice kept for 3-4 hours to down the coarse tissue particles. The supernatant solution was siphoned of leaving the coarse particles. The jamun products (Ready To Serve RTS, squash and syrup) stored in colourless glass bottles were acceptable even after six months at room temperature (Kannan and Thirumaran, 2001; Gavande *et al.*, 1995). Jackfruit (*Artocarpus heterophyllus* Lamk.) is known as the “poor man’s food”. It is generally used for culinary purposes in northern India as well as for table purpose in other parts of country. Ripe fruit can be processed for preparing the jam, squash, ready to serve beverages, chutney and papad. Fruits at early stage of the ripening may be utilized for making the preserve and candy. A puree was prepared by adding water to the fruit in the ratio of 3:1 followed by passing through a pulper. The resulting puree was

then mechanically pressed to obtain the juice (Seow and Shanmugam, 1992). Blended R.T.S. was prepared as per F.P.O. specifications (Giridharilal *et al.*, 1995) by mixing fruit juice (100 ml) with the soya milk whey at 50:50 ratio, sugar and citric acid. The processed product was pasteurized at 80° C (Saravan Kumar and Manimegalai, 2002). Squash was prepared by mixing syrup with 17 per cent juices to maintain the T.S.S of 52° Brix and 1 per cent acidity (Bhatia *et al.*, 1995). Krishnaveni *et al.* (2001) reported that the jackfruit RTS packed in green glass bottle and stored at ambient temperature have better retention of ascorbic acid and beta carotene contents. Sensory quality found highly acceptable even after storing for 6 months at room temperature. R.T.S. of jackfruit filled in sterilize glass bottle (capacity 200 ml) leaving 1 inch headspace and capped air tightly (Saravan Kumar and Manimegalai, 2002). Due to rich vitamin C existence in karonda it is being used for preparation of its jelly. Jackfruit jam is prepared through its pulp and very delicious. Similarly murabba and candy of beel is being prepared which have its medicated value and found to be very tasteful. Jamun and falsa are both minor fruits being used for the preparation of squash which is useful for diabetic patient. Minor fruits can be upgraded through value addition by incorporation of sugar to make them more accepted and tasteful among people. Therefore, the present study was conducted to find out the quality and acceptability of value added minor fruits.

### Objectives :

- To process different minor fruits for its up-gradation through addition of sugar.
- To assess the quality of value added minor fruits.

## RESOURCES AND METHODS

It was a laboratory based trial conducted within a month of preparation of particular Jackfruit jam, karonda jelly, jamun and falsa squash, beel murabba and candy during that particular season in the year 2016-2017. Different fresh products were prepared incorporating pulp, juice, pieces, syrup etc. of these fruits.

### Formulation of squashe, murabba, jam, jelly, candy using fruit pulp and extracts :

Firstly washed fruits were peeled, removed stones or chopped and into small pieces. These were used for

extracting juice or boiled till they became soft. After boiling these soft fruit pieces were grinded to malce their pulp using hand grinder or by machine. For the preparation of jelly boiled pieces with water were strained overnight and for murabba and candy sugar was added where as for squashes juice were taken out at raw stage of jamun and falsa. Then they were individually weighed by weighing balance. According to the amount of fruit pulp/pieces/juice, sugar was taken.

### Organoleptic analysis :

According to (Reddy *et al.*, 2012 and Jellink, 1985) 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 and touch when food is eaten. Two groups, *i.e.*, group A and group B were selected for organoleptic analysis using triangle test each group had 30 panel members thus the total sample size was 60. Group A was consisted with home scientists, horticulturists, agronomists and entomologists of Agriculture University, Kota. Group B was made with the common people who did not have the appropriate knowledge of different jams. Nine point Hedonic test was used to judge the different organoleptic attributes, *i.e.*, appearance, colour, taste, flavour, consistency and overall acceptability of the six prepared minor fruit products like jackfruit jam, karonda jelly, jamun and falsa squash, beel murabba and candy. In this test panel members of both groups A and B were asked to measure the degree of pleasurable and unpleasurable experience of jams on a nine point Hedonic rating scale *i.e.*, like extremely to dislike extremely. The former carried a score of 9 while latter was scored as 1. In this scale scores were categorized as 9-Like extremely, 8-Like very much, 7-Like moderately, 6-Like slightly, 5-Neither like nor dislike, 4-Dislike slightly, 3-dislike moderately, 2-Dislike very much, 1-Extremely dislike.

Mean and standard deviation were calculated for each attribute of organoleptic analysis.

## OBSERVATIONS AND ANALYSIS

Table 1 reveals that mean hedonic scores of apple jackfruit ranged between 8.0 to 8.5, all the organoleptic attributes were marked with more than 8 hedonic score indicating that appearance, colour, taste, flavour and consistency were liked very much by the panel members

of group A. The tessees liked extremely the overall acceptability of this product. Standard deviation (SD) indicates the dispersion from mean value. For example, higher SD value means the dispersion was high from the mean value. The appearance, colour, taste, flavour, consistency and overall acceptability of Karonda jelly were liked moderately by the group A as the mean scores of these attributes were more than 7. Panel members of group A gave more than 7 scores to all attributes of falsa squash except overall acceptability. The mean hedonic scores of appearance and overall acceptability were near to 8 on 9 point hedonic scale illustrating that these attributes were liked very much by the group A panel. The colour of this falsa squash was liked very much by the tessees. All organoleptic attributes of beel murabba received hedonic score near to 8 or more than 8 indicating that this was liked very much by the panellists of group A. Appearance and overall acceptability scores of falsa squash were near to 8 indicating that the product was liked very much for these to attributes. Hedonic scores of taste, flavour and consistency of falsa squash ranged from 7.4 to 7.6 depicting that these attributes were liked moderately by the panel group A. Beel candy got mean hedonic score more than 7 on 9 point hedonic scale indicating that the product was moderately liked by the tessees. The hedonic scores ranged from 7.2 to 7.8 for

beel candy. Jamun squash received highest hedonic score for all attributes. The scores were near to 9 (ranged from 8.7 to 9.0) depicting that this product was liked very much by tessees of group A for all organoleptic attributes.

Table 2 indicates the mean hedonic scores of organoleptic attributes rated by group B. All attributes of jackfruit jam got hedonic score more than 8 indicating that this jam was liked very much by all the panel members of group B. Organoleptic attributes of karonda jelly got  $\geq 7$  hedonic score illustrated that this jelly was liked moderately. Hedonic scores of organoleptic attributes of falsa squash ranged from 7.3 to 8.2. The score of appearance colour and overall acceptability were higher than 8 on 9 point scale whereas score of taste were neat to 8 thus these attributes were liked very much by the group B. Hedonic scores of beel candy ranged from 7.2 to 7.9 on 9 point scale illustrating that the product was liked moderately for its different organoleptic attributes.

All organoleptic attributes of beel murabba were higher than 8 illustrating that this was liked very much by group B. The hedonic score of attributes of jamun squash ranged from 8.6 to 8.9 these score were near to 9 indicating that the products were liked extremely by the panel members of group B.

Overall results indicated that all these value added minor fruit products were liked equally by the panel

**Table 1 : Minor fruits up-gradation by quality assessment and acceptance through mean hedonic scores of organoleptic attributes of value added products by group A (n=30)**

Attributes	Jackfruit jam	Karonda jelly	Falsa squash	Mean $\pm$ SD		
				Beel candy	Beel murabba	Jamun squash
Appearance	8.5 $\pm$ 0.51	7.5 $\pm$ 1.00	7.9 $\pm$ 0.96	7.8 $\pm$ 1.14	8.0 $\pm$ 1.07	8.8 $\pm$ 0.91
Colour	8.1 $\pm$ 0.96	7.2 $\pm$ 1.21	8.1 $\pm$ 0.71	7.5 $\pm$ 0.94	8.0 $\pm$ 0.96	8.7 $\pm$ 1.12
Taste	8.0 $\pm$ 1.04	7.7 $\pm$ 0.65	7.6 $\pm$ 1.23	7.2 $\pm$ 0.30	8.2 $\pm$ 0.76	8.9 $\pm$ 0.79
Flavour	8.0 $\pm$ 0.92	7.6 $\pm$ 1.31	7.4 $\pm$ 1.31	7.0 $\pm$ 0.79	7.9 $\pm$ 1.28	8.9 $\pm$ 0.91
Consistency	8.1 $\pm$ 0.72	7.2 $\pm$ 0.91	7.5 $\pm$ 1.05	7.5 $\pm$ 0.94	8.0 $\pm$ 1.00	8.8 $\pm$ 1.28
Overall acceptability	8.5 $\pm$ 0.64	7.3 $\pm$ 1.02	7.9 $\pm$ 0.96	7.5 $\pm$ 0.94	8.3 $\pm$ 1.02	9.0 $\pm$ 0.00

**Table 2 : Minor fruits up-gradation by quality assessment and acceptance through mean hedonic scores of organoleptic attributes of value added products by group B (n=30)**

Attributes	Jackfruit jam	Karonda jelly	Falsa squash	Mean $\pm$ SD		
				Beel candy	Beel murabba	Jamun squash
Appearance	8.5 $\pm$ 0.45	7.7 $\pm$ 0.45	8.2 $\pm$ 0.68	7.9 $\pm$ 0.71	8.4 $\pm$ 0.30	8.8 $\pm$ 0.51
Colour	8.1 $\pm$ 0.55	7.2 $\pm$ 0.92	8.1 $\pm$ 0.51	7.6 $\pm$ 0.50	8.2 $\pm$ 0.47	8.8 $\pm$ 0.41
Taste	8.0 $\pm$ 0.51	7.5 $\pm$ 0.85	7.9 $\pm$ 0.79	7.6 $\pm$ 1.04	8.3 $\pm$ 0.47	8.8 $\pm$ 0.51
Flavour	8.0 $\pm$ 0.76	7.6 $\pm$ 0.94	7.3 $\pm$ 0.80	7.2 $\pm$ 0.89	8.2 $\pm$ 0.41	8.6 $\pm$ 0.50
Consistency	8.0 $\pm$ 0.61	7.2 $\pm$ 0.89	7.5 $\pm$ 0.51	7.8 $\pm$ 0.76	8.5 $\pm$ 0.50	8.6 $\pm$ 0.50
Overall acceptability	8.5 $\pm$ 0.61	7.5 $\pm$ 1.14	8.0 $\pm$ 0.55	7.5 $\pm$ 0.68	8.2 $\pm$ 0.41	8.9 $\pm$ 0.50

members of both group A and group B. These products were tasty and palatable. Testees said that the products were appealing, mouth watering and had higher palatability. Panellists said that these minor fruits products were not only had higher acceptability but they contained various therapeutic benefits also as well as they are nutritive alongwith time, money and energy saving. Apart from high acceptability these are the rich source of energy and contained various micro nutrients and vitamins due to addition of fruit pulp. These products were highly nutritious and have the added advantage of therapeutic potential of individual food items. These can be best food items for energy deficit individuals.

### Conclusion :

Delicious minor fruit products like jackfruit jam, karonda jelly, jamun and falsa squash, beel murabba and candy were formulated in present study. It was observed that both group A and group B liked all the products. On the basis of overall acceptability, it can be asserted that jackfruit jam, jamun and falsa squash, beel murabba were liked very much by the panel members whereas karonda jelly and beel candy were liked moderately by them. Acceptability of these minor fruit products were very high jamun squash to received highest score because it had the therapeutic characteristics making it most likeable product among all of them. These developed minor fruit products like jackfruit jam, karonda jelly, jamun and falsa squash, beel murabba and candy can be used as spreads and fruit marmalade and individuals can consume them with bread, chapatti or parantha. People can refresh themselves throughout the year with the tasty flavours of minor fresh fruits in the form of fruit jams, jellys, murabbas, candies, squashes.

Authors' affiliations :

**Gunjan Sanadya**, Agriculture University, Kota (Rajasthan) India

### REFERENCES

**Bhatia, B.S.**, Siddapa, G. and Lal, G.(1995). Development of

products from jackfruit: Part III- jackfruits preserve, candy, chutney, and dried bulb. *Indian Food Packer*, **9**: 7.

**Gavande, U.K.**, Joshi, G.D. and Wasker, D.P. (1995). Storage of jamun (*Syzygium cuminii*) fruit product. *ASEAN Food J.*, **10** (2): 54-56.

**Girdhari Lal**, Siddapa, G.S. and Tandon, G.L. (1995). Preserves candied and crystallized fruits. In: Presevation of Fruit and Vegetables. ICAR, New Delhi, India.

**Jellinek, G.** (1985). *Sensory evaluation of food-theory and practice*. Ellis Horwood, Ltd. (ed.). Chichester, Reino Unido.

**Kannan, S.** and Thirumaran, A.S. (2001). Storage life of jamun products. *Processed Food Industry*, **5**(1): 18-19.

**Krishaveni, A.**, Manimegalai, G. and Saravan Kumar, R. (2001). Storage stability of jackfruit R.T.S. beverages. *J. Food Sci. & Technol.*, **36** (6): 601-602.

**Prasad, R.N.** and Mali, P.C. (2000). Changes in physico-chemical characteristics of pomegranate squash during storage. *Indian J. Hort.*, **5**(1): 18-21.

**Ramanjaneya, K.H.** (1985). Studies on some aspects of jamun and its processing. Ph.D. Thesis. I.A.R.I., New Delhi. India.

**Rasul, N.** (2001). Value addition due to food processing and income distribution amongst the poor. *Indian Food Industry*, **20**(6): 17-20.

**Reddy, M.A.**, Elavarasan, A., Reddy, D.A. and Bhandary, M.H. (2012). Suitability of reef cod (*Epinephelus diacanthus*) minced meat for preparation of ready to serve product. *Adv. Appl. Sci. Res.*, **3**(3): 1513-1517.

**Saravan Kumar, R.** and Manimegalai, G. (2002). Storage stability of soya milk whey based jackfruit juice blended R.T.S. beverages. *Processed Food Industry*, **6** : 42- 47

**Seow, C.C.** and Shanmugam, G. (1992). Storage stability of canned jackfruit juice at tropical temperature. *J. Food. Sci. Technol.*, **29** (6): 371-374.

**Shukla, K.G.**, Joshi, M.C., Yadav, S. and Bisht, N.S. (1991). Jamun wine making: standardization of a methodology and screening culture. *J. Food Sci. Tech.*, **28** (3): 142

**Vijayan, K.** and Prabhat, A. (2015). Formulation, standardization and shelf life study of water melon incorporated grape squash. *Curr. Res. Nutri. & Food Sci.*, **3**(2):150-155.

13<sup>th</sup>  
Year  
★★★★★ of Excellence ★★★★★