Pak. j. sci. ind. res. Ser. B: biol. sci. 2012 **55** (3) 172-174

## Short Communication

# Assessment of Selected Quality Attributes of Jam Formulated from Baobab-Hogplum Fruits

**Adekanmi Oyeyinka Abioye[a]*, Samson Adeoye Oyeyinka[b], Adewumi Toyin Oyeyinka[c] and Sarafadeen Omowumi Kareem[a]**

[a]Department of Food Science and Engineering, Lautech, Ogbomoso, Nigeria
[b]Department of Home Economics and Food Science, University of Ilorin, Ilorin, Nigeria
[c]Department of Food Science and Nutrition, University of Leeds, United Kingdom

(received November 10, 2011; revised May 18, 2012; accepted August 15, 2012)

**Abstract.** In this study, possibility of making jam from two underutilized fruits (baobab and hogplum fruits) known to have high pectin content was investigated. This will increase their consumption and further promote the popularity of jam among rural dwellers where these crops are found. Baobab and Hogplum fruits were cleaned, sorted, weighed and their pulps were extracted in each case using a mesh. Formulation was made in different proportions (100:0, 0:100, 70:30, 30:70, and 50:50) using both fruits. Dissolved sugar and acidifying agent (lime) were added to the mixture and heated at 80 °C until it sets. Samples were stored, under refrigeration till analysis. The jam samples were analyzed for pH, total soluble solids (°Brix), titratable acidity (TTA), ascorbic acid, β-carotene and moisture content (MC). Sensory attributes of the samples were compared with a commercial jam (apricot jam (APJ).

**Keywords:** baobab fruit, hog plum fruit, ascorbic acid, jam, beta carotene

The different plant parts of Baobab (*Adansonia digitata* L.) are widely utilized as foods, medicines and the bark fibres are also used (Sidibe and Williams, 2002). Its fruits are rich in organic acids such as citric, tartaric, malic, succinic and ascorbic acid and water soluble pectin, calcium and iron (Wilkinson and Hall, 2007). Nutritional analysis of baobab fruit pulp has shown that it is an excellent source of pectin, calcium vitamin C and iron (Wilkinson and Hall, 2007; Ajayi *et al*., 2003; Manfredini *et al*., 2002; Sidibe and Williams, 2002). It also has been reported to find application in local diets as seasoning agents and appetizer and as a milk substitute when soaked in water (Ajayi *et al*., 2003). Hogplum (*Spondias mombin* L.) fruit is known as Spanish plum or gully plum in Jamaica (Adepoju, 2009).

Jams are products formulated from a minimum fruit content of 40% and a final soluble solid content of 45° Brix. Some additives such as citric acid, gelling agents and pectin can be added (García-Martínez *et al*., 2002). The objective of this work is to produce and evaluate the quality of jam prepared from baobab (*Adansonia digitata* L.) family Malvaceae and hogplum fruit (*Spondias mombin* L.). Hogplum fruit contains 82.3% moisture, 2.6% protein, 2.0% lipid, 4.2% fibre, 1% ash 7.9% total carbohydrates and 4.7% total soluble sugars. The fruit is also rich in carotene (85 µg/100 g), ascorbic acid (34 mg/100 g) and relatively small amounts of niacin (0.5 µg/100 g) and riboflavin (0.07 µg/100 g) (Adepoju, 2009).

*Author for correspondence; E-mail: Oyeyinka@unilorin.edu.ng; sartf2001@yahoo.com

**Jam preparation.** Fresh hogplum, baobab fruits and acidity agent (lime) were obtained from an agricultural farm in Ogbomoso for preparation of jam, while food grade commercial sucrose was purchased from a laboratory chemical store in Ogbomoso, Nigeria.

The jam was prepared using method described by Oyeyinka *et al*. (2011) with slight modification. A weight of 200 g was used to formulate the sample composition in ratio (100:0, 0:100, 70:30, 30:70, and 50:50) for baobab and hogplum fruits, respectively. Food grade commercial sucrose was made into syrup using 60% of the weight of the fruits as basis. Acidity agent (lime) was added while the syrup solution simmered at a temperature of about 80 °C. The fruits were added in the right proportion following operating conditions determined from preliminary studies. The jams were hot-filled into sterilized jars, sealed and rapidly cooled under running water to minimize thermal stress. The products were stored under refrigeration until analysis.

**Quality evaluations.** Titratable acidity (TTA), pH, moisture content, total soluble solids (Brix), gel strength,

ascorbic acid and β-carotene were determined using methods described by AOAC (1990).

**Sensory evaluation.** The jam samples along with bread serving as a carrier were presented to 10 semi-trained panelists using the method described by Taiwo *et al*. (1997). The panelists were asked to indicate their observations using a 5-point hedonic scale for aroma, colour, taste spreadability and overall acceptability. Like extremely and dislike extremely was ranked 5 and 1, respectively.

**Microbiological analysis.** The total viable counts of the samples were analyzed by the method of Olutiola *et al*. (1991). Serial dilutions were done in sterile distilled water and platings were on plate count agar (PCA, Lab M). The mean of replicate platings were calculated and the total number expressed as cfu/g. Pure cultures of isolates were stored on nutrient agar slants in a refrigerator (at 4 °C). The isolates were characterized using method described by Olutiola *et al*. (1991).

**Statistical analysis.** All analyses were carried out in triplicates. Data were subjected to analysis of variance (ANOVA) and means were separated using Duncan's Multiple Range Test at $p \leq 0.05$ (Gomez and Gomez, 1985; Steel and Torrie, 1980).

The result is presented in (Table 1) shows the chemical composition of freshly harvested hogplum and baobab fruit pulps. The pectin, pH and β-carotene content were higher in hogplum than in baobab pulp. On the other hand, the TTA and vitamin C content of baobab pulp was higher than those recorded for hogplum fruit pulp.

The chemical compositions (TTA, pH, brix, moisture content, ascorbic acid and β-carotene) of the jam samples made from baobab and hogplum fruits pulp in ratio are presented in (Table 2), while data on the sensory evaluation of the jams are presented in (Table 3). The microbial analysis of the formulated jam samples revealed that they contain Pseudomonas and *Proteus* spp. (Table 4).

**Table 1.** Selected chemical composition of raw hog plum and baobab fruits

| Parameters | Hog plum | Baobab |
|---|---|---|
| % Pectin | 8.60±0.27a | 2.43±0.12b |
| pH | 5.58±0.03a | 4.52±0.03b |
| TTA % | 2.93±0.06b | 9.77±0.15a |
| Vitamin C (mg/100 g) | 48.20±0.30b | 88.33±2.89a |
| β-carotene (µg/100 g) | 81.67±5.77a | 30.00±0.00b |

The values with the same alphabets are not significantly different from each other ($P < 0.05$).

**Table 2.** Selected chemical composition of jam prepared from baobab-hog plum fruit pulp

| Sample | TTA (%) | pH | Brix (°) | M.C (%) | Vit C (mg/100 g) | β-Carotene (µg/100 g) |
|---|---|---|---|---|---|---|
| APJ | 5.37±0.06a | 3.27±0.06b | 65.00±0.00a | 29.50±0.10b | 24.27±0.25d | 105.00±0.00a |
| HPJ | 5.23±0.06a | 3.20±0.00c | 62.00±0.00c | 30.13±0.06a | 36.03±0.21c | 95.00±0.00b |
| BBJ | 3.27±0.06c | 4.47±0.06a | 65.33±0.58a | 29.47±0.06b | 51.57±0.06a | 30.00±0.00e |
| JHB | 4.83±0.06b | 3.50±0.06b | 60.00±0.00c | 28.73±0.15c | 44.23±0.25b | 75.00±0.00d |
| BHJ | 5.00±0.1b | 3.37±0.06b | 61.00±0.00c | 30.37±0.06a | 42.30±0.17b | 85.00±0.00c |
| HBJ | 5.40±0.00a | 3.40±0.00b | 63.33±0.58b | 29.03±0.06b | 40.93±0.12b | 85.00±0.00c |

The values with the same alphabets are not significantly different from each other ($P < 0.05$). APJ = Apricot Jam (A commercial jam product); JHB = 50% Hogplum and 50% baobab jam; HPJ =100% Hogplum jam; BHJ = 70% Baobab and 30% Hogplum; BBJ = 100% Baobab jam; HBJ = 70% Hogplum and 30% baobab jam.

**Table 3.** Sensory properties of jams made from baobab-hog plum fruit pulp

| Sample | Colour | Flavour | Taste | Texture | Spreadability | Overall acceptability |
|---|---|---|---|---|---|---|
| APJ | 4.11b | 3.44a | 4.33a | 3.11b | 3.33c | 4.44a |
| HPJ | 4.89a | 2.56c | 3.56b | 3.11b | 2.56e | 3.78b |
| BBJ | 2.11f | 2.67c | 2.22d | 3.44b | 3.67b | 2.44d |
| BHJ | 3.11d | 3.33b | 3.56b | 3.89a | 4.00a | 3.22c |
| HBJ | 2.67e | 3.11b | 3.00c | 2.67c | 3.00d | 2.56d |
| JHB | 3.78c | 3.33b | 3.67b | 2.67c | 3.44c | 3.11c |

The values with the same alphabets are not significantly different from each other ($P < 0.05$).

**Table 4.** Microbial load of formulated jam samples

| Samples | Total viable count | Organisms isolated |
|---|---|---|
| APJ | $4.0x10^1$ | *Pseudomonas* spp., *Proteus* spp. |
| HPJ | $4.0x10^3$ | *Pseudomonas* spp. |
| BBJ | $4.0x10^3$ | *Pseudomonas* spp. |
| JHB | $4.0x10^3$ | *Pseudomonas* spp. |
| BHJ | $4.0x10^3$ | *Pseudomonas* spp. |
| HBJ | $4.0x10^3$ | *Pseudomonas* spp. |

The values reported are the means of triplicate determinations.

The study has demonstrated enormous potential of baobab and hogplum fruits in food product development. It has also provided an avenue to reduce post harvest losses of fruits and vegetables which has been estimated to be 50% loss annually. The findings from this study have shown that quality jam can be made from a blend of baobab and hogplum fruit in ratio 70:30, respectively.

## References

Adepoju, O.T. 2009. Proximate composition and micronutrient potentials of three locally available wild fruits in Nigeria. *African Journal of Agricultural Research*, **4:** 887-892.

Ajayi, I.A., Dawodi, F.A., Oderinde, R.A. 2003. Fatty acid composition and metal content of Adansonia digitata seeds and seed oil. *La Rivista Italiana delle Sostanze Grasse*, **80:** 41-43.

AOAC. 1990. *Official Methods of Analysis*, Association of Official Analytical Chemists. 15th edition, Washington, DC, USA.

García-Martínez, E., Ruiz-Diaz, G., Martínez-Monzó, J., Camacho, M.M., Martínez-Navarrete, N., Chiralt, A. 2002. Jam manufature in osmo-dehydrated kiwi fruit characterization of reused osmotic solution as ingredient in new product formulation. *Food Research International Journal*, **35:** 307-313.

Gomez, A.K., Gomez, A.A. 1984. *Statistical Procedure for Agricultural Research*. 2nd edition, Wiley, New York, USA.

Manfredini, S., Vertuani, S., Braccioli, E., Buzzoni, V. 2002. Antioxidant capacity of *Adansonia digitata* fruit pulp and leaves. *Acta Phytotherapeutical*, **2:** 2-7.

Olutiola, P.O., Sonntag, H.G., Famurewa, O. 1991. *An Introduction to General Microbiology - A Practical Approach*. pp. 42-53, Verlagsantalt and Druckerei, Heidelberg, Germany.

Oyeyinka, S.A., Adeomowaye, B.I.O., Ngoddy, P.O., Karim, O.R. 2011. Selected quality attributes of jam produced from osmo-dehydrated cashew apple. *Journal of Food Technology*, **9:** 27-31.

Sidibe, M., Williams, J.T. 2002. Baobab - Adansonia digitata. Fruits for the future 4, 96 pp., International Centre for Underutilised Crops, Southampton, UK.

Steel, R.G.D., Torrie, J.H. 1980. *Principles and Procedures of Statistics*, 2nd edition, McGraw-Hill, New York, USA.

Taiwo, K.A., Akanbi, C.T., Ajibola, O.O. 1997. Establishing Processing Conditions for Canning Cowpea seeds in tomato sauce. *International Journal of Food Science Technology*, **32:** 313-324.

Wilkinson, J., Hall, M. 2007. Baobab fruit, the upside down tree that could turn around the drinks industry. In: *Botanical Soft Drinks International*, pp. 26-28, April 2007, Available in: http://www. softdrinks-international.com/Archive.