Int.J.Curr.Microbiol.App.Sci (2023) *12*(01): 23-28

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Volume 12 Number 1 (2023)**
Journal homepage: http://www.ijcmas.com

Original Research Article https://doi.org/10.20546/ijcmas.2023.1201.003

Acceptability and Chemical Evaluation of '*Labdae*': A Traditional Ber-Preserve from Underutilized Ber (*Ziziphus* sp.)

Aparana Sharma*

JNKVV-College of Agriculture, Ganjbasoda: 464221, District- Vidisha, Madhya Pradesh, India

**Corresponding author*

Keywords

Ber preserve, underutilized, chemical properties, sensory evaluation

Article Info

Received:
09 December 2022
Accepted:
29 December 2022
Available Online:
10 January 2023

A B S T R A C T

Ber (*Ziziphus* sp.) is a nutritionally rich fruit especially with respect to minerals and vitamins *viz.*, phosphorous, calcium, iron and vitamins A, B and C. However, due to its small size and stone inside, slightly bitter or pungent taste, the fruit is not popularly consumed and utilized. '*Labdae*' is a local name for ber-preserve made from local variety or underutilized ber fruit in Vindhya plateau of Madhya Pradesh. The product utilizes whole ber fruit, slightly dried and fully ripe, which is cooked by soaking in sugar solution. In the present investigation, the fresh, healthy ber fruits from the local seller were purchased. The ber fruits were washed and dried using three different methods viz., sun drying, microwave drying and drying at room temperature. The dried ber fruits were further used for the preparation of ber-preserve i.e., '*Labdae*', as is commonly known in local language. The recipe for the preparation of *Labdae* was standardized in the laboratory and slight modifications were done in the 'basic' recipe as per the experiment. The recipe was standardized for both the slow and quick method of preserve preparation. The standardized products from each category were evaluated for its sensory acceptability and chemical properties. The conventional ber-preserve available in the market was kept as 'control' for evaluation purpose. The final prepared product contained 21.23 – 22.89 per cent moisture, with TSS between 64.82 – 66.92^{O}Brix and 1.13- - 1.80 per cent acidity (as citric acid). The organoleptic scores of the laboratory prepared ber-preserve as compared to locally available product revealed higher acceptability scores for colour (6.92), taste (6.92), flavour (7.04), mouthfeel (7.21) and overall acceptability (7.02) on the basis of 9 point hedonic scale. Hence as per the study, ber-preserve is a good option for utilizing and preserving the nutritious properties of an under-utilized. As the drying method and cooking process also improved its acceptability '*Labdae'* (the traditional ber-preserve) could make a move in the modern kitchens as a nutritious, fruit-based sweet-meat option.

Introduction

India is a blessed country with respect to the availability of varied type of vegetation due to its geographic location. Not only the cultivable lands are yielding foods of desired traits but the uncultivable lands have the vegetation which is nutritionally rich and can be used as a food ingredient. Ber (*Ziziphus* sp.) is one such fruit, which grows wild in most of the arid regions of

India. At times, this traditionally uncultivated fruit (not belonging to any specific variety) is relished by local people, that too of a specific stage of maturity and for rest of the season the fruit remains unattended. However due to its typical taste and characteristics to stand the tough climatic conditions, it is considered as 'Poor man's apple' and 'King of arid zone fruits'.

It performs very well in marginal lands and/ or inferior soils where most of the fruit trees fail (Nandwani and Duquesne, 2014). Ber is often called as poor man's fruit and is one of the richest source of vitamin C, A and B (Chadda *et al.*, 1972). Reports are available that there is no much difference in the nutritive quality of the processed products as against the fresh one (Lal *et al.*, 1996). Uncultivated, underutilized traditionally available Ber (*Ziziphus* sp.) on road sides, waste lands, bunds, forests etc is basically a nutritionally rich fruit especially with respect to minerals and vitamins *viz.*, phosphorous, calcium, iron and B vitamins.

Ber can act as an energy provider as it is rich in starch and sugars including glucose, sucrose and fructose. The protein portion of ber contains many essential amino acids like asparginine, arginine, glutamic acid, aspartic acid, glycine, serine and threonine (Bal, 1981; Jawanda and Bal, 1978).

However, due to its small size and stone it is not enjoyed like other fruits. Hence, an attempt was made to preserve the richness of fruit in the form of an acceptable product.

'*Labdae*' is a local name for ber-preserve made from local variety or underutilized ber fruit in Vindhya plateau of Madhya Pradesh. The product utilizes whole ber fruit which is cooked by soaking in sugar solution. It is basically enjoyed as savoury fruit tossed with little salt and spices. Keeping in mind, the huge availability, nutritive value, low cost and its importance in curing some of the 'deficiency diseases' the present study was envisaged with the objective of utilizing ber-fruit in the preparation of '*Labdae'* a traditional ber-preserve"

Materials and Methods

Procurement

In the present investigation, the fresh, healthy ber fruits from the local sellers were purchased. The ber fruits were washed in clean fresh running water and dried in open air by spreading on muslin cloth to remove surface moisture. The fresh ber fruits were dried using three methods viz., open sun drying, microwave drying and open air drying (at room temperature). The drying process was a part of traditional preparation as well, where freshly pluck ber fruits are left in open air for 4-5 days.

Preparation

The recipe for the preparation of ber-preserve i.e., '*Labdae*', as is commonly referred by local people, was standardized by modifying the 'basic' recipe. Traditionally '*Labdae'* is made by cooking ber fruits in sugar solution until soft. In the present investigation, the dried ber fruits were re-hydrated by using a steam bath (maintained at $100 \pm 5^{O}C$) for 5-7 min. This turned the surface of ber fruits soft and supple, like the fresh ones. Two methods of preserve preparation were used, i.e., slow method and quick method were used for the preparation of '*Labdae*'.

Recipe

In quick method of ber preserve preparation, the re-hydrated fruits were soaked in sugar syrup ($65^{O}B$) for 48 hrs. The fruits were then cooked completely till the syrup was sufficiently thick (68-70 ^{O}B). In the slow method of preserve preparation, re-hydrated fruits were dipped in previously prepared sugar syrup ($65^{O}B$) cooled at room temperature for 24 hours. After cooling, the fruits were drained out and sugar syrup was again cooked upto $65^{O}B$, cooled and the fruits were again dipped and rested for 24 hours. In the third round also, fruits were drained and syrup was cooked upto $68^{O}B$. The fruits were dipped and glazed with sugar syrup as a final product.

Treatments

The whole experiment was randomly designed with the following treatments: T1: Control (purchased from market); T2: Sun drying + slow method; T3: Sun Drying + quick method; T4: Microwave drying + slow method; T5: Microwave drying + quick method; T6: Room temperature + slow Method; T7: Room temperature + quick method

Analysis

The fresh ber fruits were evaluated for their physical parameters including weight (g), length (cm), breadth (cm) and diameter (cm) using simple measuring techniques. Fresh ber fruits were also evaluated for its moisture (%), TSS (°B), acidity (% as citric acid) and ascorbic acid (mg/100g).

The prepared ber preserve from each lot was also evaluated for its chemical (TSS, acidity, sugars and ascorbic acid) and sensory (colour, taste, flavor, mouthfeel and overall acceptability) characteristics. For chemical evaluation of preserve standardized AOAC methods were used in the laboratory. Sensory evaluation was conducted by a panel of judges on 9 point hedonic scale under standard protocols.

Results and Discussion

Physico-chemical evaluation of local ber

A first hand evaluation of the ber (local variety) used during the study was done. Table 1 gives an overview of the underutilized ber used for the study. A set of three readings were observed and mean values were calculated to express the results. The fresh ber utilized for the study weighed approximately 9.42-12.26gm with length measuring 2.9-3.4cm and diameter of 7.4-7.8cm.

The colour of fresh ber fruits varied from golden yellow to red-brown. Physico-chemical parameters of ber revealed the moisture content of 73.14 per cent, TSS 7.42°B, acidity 0.48 per cent (as citric acid) and ascorbic acid 70.25mg/100g. Similar results were reported by Sharma *et al.,* (2016) for underutilized Chinese ber (*Ziziphus jujube* Milli) where ovoid and elongated shaped fruits weighed between 9.56-12.9g/fruit. The length and diameter of the fruit ranged between 15.36-34.23mm and 2.58-18.50mm respectively.

Fruit, on average, contained 78.46 per cent moisture, 9.1 °B TSS, 0.34 per cent acidity (as malic acid). Also, Koley *et al.*, (2011) reported Indian *Ber* to be a good source of ascorbic acid and total phenolics ranging from 19.54 to 99.49 mg/100g and 172 to 328.6 mg GAE/100g respectively. However, the slight variation in the parameters could be due to difference in microclimatic and geographical conditions prevailing at the growing regions.

Sensory Acceptability

The ber preserve '*Labdae'* were evaluated for its acceptability by a panel of judges on the basis of 9-point hedonic scale. The product was evaluated for its colour, taste, flavour, mouthfeel and overall acceptability. Table 2 reveal the sensory scores of the ber preserve from each lot shows that the colour of product improved when dried in controlled conditions and prepared using slow method.

The colour of 'control' was 6.49 (T1) which considerably improved to 6.62 (T2; sundried + slow method), 6.64 (T6; room temperature + slow method), 6.80 (T5; microwave drying + quick method) and 6.92 (T5; microwave dried + slow method). The drying treatments and cooking method had significant effect on the taste scores of the '*Labdae'* and highest score of 6.82 were given to products prepared from ber which were microwave dried and prepared using slow method (T4) as compared to 6.18 of control (T1).

Microwave drying of ber and slow method of preserve preparation (T4) had highest score (7.04) for flavour. Mouthfeel of ber preserve improved significantly with all treatments and better scores (7.21) were recorded for T4 as compared to 6.88 for

control (T1). The overall acceptability of the prepared products improved significantly with drying technique and cooking methods used for the preparation of the product. The improved scores for colour, taste, flavour, mouthfeel and overall acceptability of ber preserve can be attributed to controlled conditions of the treatments used during the preparation of the product.

Khurdiya and Singh (1975) standardized the process of *ber* murraba. The prepared fruit was kept overnight in 20 to 30 per cent sugar syrup containing 0.5 per cent citric acid. After one week, the syrup was concentrated to 70 per cent.

The present results are in conformity with the results of Lande (2013), who reported that the ber preserve prepared by slow method was better in respect of retention of the quality attributes like colour, taste, texture and flavour as compared to quick method. Sharma *et al.,* (2016) developed ber preserve and candy where the consistency of sugar syrup was 40^{O}B initially which was gradually increased upto 70 and 75^{O}B respectively in the final product.

Also, sensory scores of the present study are in agreement with the study of Sharma *et al.,* (2016) who reported maximum acceptability (8.0) for ber preserve as compared to pickle, candy and osmotically dehydrated ber fruits.

Chemical evaluation

The standardized product was evaluated for its chemical properties including moisture, TSS, acidity (per cent as citric acid), ascorbic acid, reducing, non-reducing and total sugars (Table3). The moisture content of the prepared products varied significantly with the drying methods used and the method of preserve preparation.

The moisture content of the preserve decreased significantly from 28.22 per cent in control to 21.23 per cent in preserve of ber dried using microwave and prepared using slow method. This can be attributed to absorption of sugar in the ber fruit during cooking which left no free moisture in the final product. Also, the TSS of ber preserve improved significantly with from 62.56°B (control) to 68.42°B in T4, as the slow method of preserve preparation retained better solids in the preserve as compared to quick method of preserve preparation.

Acidity (per cent as citric acid) of *Labdae* increased with different drying and product preparation methods. Higher acidity was observed in T2 (1.80%) and T7 (1.66%) as compared to control T1(1.11%). Drying methods and preparation method had positive effect on ascorbic acid retention in the prepared products and it was higher in T4 (microwave dried + slow method) viz., 31.16 mg/100g as compared to 26.42 mg/100g in control.

The drying method (microwave drying) took lesser time to expose the fruit tissues to heat hence it contributed to more retention of ascorbic acid in the ber fruits. There was a considerable increase in sugar (reducing, non-reducing and total) content of *Labdae* with drying method and preparation method.

In control samples the reducing, non-reducing and total sugars were 44.82, 21.64 and 68.88 per cent respectively which increased upto 47.24 per cent (T7), 24.82 (T5) and 72.48 per cent(T4) respectively.

The physico-chemical parameters of ber preserve as reported by Sharma *et al.,* (2016) indicated moisture content of 20.75 percent, TSS 66.10^{O}B, 0.95 per cent acidity, 55.28 per cent total sugars and 30.15 mg/100g ascorbic acid.

The readings were slightly higher than the readings reported by Sharma *et al.,* (2016) which can be due to the variation in the preparation process as well as the varietal difference between the ber fruit.

Goyal *et al.,* (2008) studied the vitamin C content and overall acceptability of *ber* preserve. It was observed that the content in the raw *ber* was found to be 84 mg/100g whereas it was recorded as 50.83 mg/100g in *ber* preserve.

Table.1 Mean values of Physico-chemical characteristics of Ber (*Ziziphus sp.*)

Characteristics	Range/ Values
Physical	
Weight (g)	9.42-12.26
Length (cm)	2.93-3.40
Diameter (cm)	7.4-7.8
Chemical	
Moisture (%)	73.14
TSS (^{O}B)	7.42
Acidity (% as citric acid)	0.48
Ascorbic acid (mg/100g)	70.25

Table.2 Sensory scores of '*Labdae'* (Ber preserve) on the basis of 9 point hedonic scale

Treatments/ Parameters	Colour	Taste	Flavour	Mouthfeel	Overall acceptability
T1	6.49	6.18	6.25	6.88	6.45
T2	6.62	6.62	6.39	6.42	6.51
T3	6.22	6.49	6.44	6.44	6.40
T4	6.92	6.92	7.04	7.21	7.02
T5	6.80	6.45	6.98	7.00	6.81
T6	6.64	6.44	6.66	6.72	6.62
T7	6.44	6.10	6.82	6.68	6.51
CD (0.05)	0.29	0.46	0.55	0.14	0.24

Table.3 Chemical characteristics of '*Labdae'* (Ber preserve)

Treatments/ Parameters	Moisture (%)	TSS (^{O}B)	Acidity (% as citric acid)	Ascorbic acid (mg/100g)	Reducing sugars (%)	Non-reducing sugars (%)	Total sugars (%)
T1	28.22	62.56	1.11	26.42	44.82	21.64	68.88
T2	22.16	66.33	1.80	29.66	47.04	24.53	72.22
T3	22.76	64.82	1.42	28.42	46.86	24.14	71.44
T4	21.23	68.42	1.13	31.16	47.08	24.44	72.48
T5	22.63	64.96	1.28	30.42	46.73	24.82	72.29
T6	22.89	66.92	1.52	30.15	47.12	24.36	71.86
T7	22.16	65.42	1.66	30.06	47.24	23.88	72.33
CD (0.05)	0.09	0.87	0.25	1.02	2.22	1.86	2.96

'*Labdae'*, the traditional ber-preserve is a good option for preserving the nutritious fruit for a longer time. The overall acceptability of the product reveals that the ber-preserve was at par with that available in the market, however, drying technique (microwave) and cooking method improved its sensory characteristics. Preparation of 'Labdae' using standardized methods will help us to preserve a nutritious commodity for long and as the product is already popular amongst children, young mothers and other people vulnerable to 'deficiency disorders', this could be a good option for fighting malnutrition. Also, popularization and marketing of the product will encourage the farmers to grow more

fruit trees in waste lands, erosion-susceptible farms and other areas. Proper marketing of product can fetch good prices to the farmers, processors and will add to their regular income.

Acknowledgement

Author is thankful to Madhya Pradesh Council of Science & Technology, Bhopal for funding the study. Also, the support of university authorities for supporting the conduct of the study is fully acknowledged.

References

Bal J. S. (1981). A note on sugars and amino acids in ripe *ber*. *Progressive Horticulture*, 13 (3/4): 41-42.

Chadda, K. L., Gupta, M. R. and Bajwa, M. S. (1972). Performance of some graphite varieties of ber in Panjab, *Indian J. Hort.*, 29 (2): 137-150.

Jawanda, J. S. and Bal, J. S. (1978). Studies on physicochemical characteristics of *ber* CVS grown at Ludhiana. *Horticulture Journal*, 1:42-45

Khurdiya, D. S. and Singh, R. N. (1975). *Ber* and its products. *Indian Horticulture*, 20: 5-25.

Koley, T. K., Charanjit, K., Shweta, N., Shweta, W., Seema, J and Sarika. (2011). Antioxidant Activity and phenolic content in genotypes of Indian jujube (*Zyziphus mauritiana* Lamk.). *Arabian Journal of Chemistry.*2:62-65

Lal, G., Siddapa, G. S. and Tandon, G. L. (1996). Preservation of fruits and vegetables revised Ed. Pub. By ICAR, pp. 198-199.

Lande, Rekha A. (2013). Preparation and storage stability of ber preserve at home scale. *Food Sci. Res. J.*, 4(2): 126-129.

Nandwani, D., and Duquesne, I. (2014). *Sustainable Horticultural Systems*. Springer International Publishing.

Sharma, Rakesh and Rana, J C (2016). Nutritional composition and value added products of *Chinese Ber (Ziziphus jujuba* Mill) growing in Northern Hill regions of India. Indian Journal of Natural Products and Resources. 7(4): 323-327

How to cite this article:

Aparana Sharma. 2023. Acceptability and Chemical Evaluation of '*Labdae*': A Traditional Ber- Preserve from Underutilized Ber (*Ziziphus* sp.). *Int.J.Curr.Microbiol.App.Sci.* 12(01): 23-28.
doi: https://doi.org/10.20546/ijcmas.2023.1201.003