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ORGANOLEPTIC EVALUATION OF VALUE ADDED UNDERUTILIZED FRUITS: AONLA AND BER

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ABSTRACT

Underutilized edible plants are those that are minor, neglected, local, orphan and promising species that are used as food, fodder and pharmaceuticals. The primary goals of processing under used fruit plants are to maintain nutritional content, decrease post-harvest loss, eliminate waste, reduce seasonality and improve quality. Thus keeping this in mind the present study, *Aonla* and *ber* fruits were used to developed various products i.e. pickle, *chutney*, *churan*, *murabba*, *sharbat*, candy and *jam* in the laboratory. The products of *Aonla* and *Ber* fruits were commonly consumed in the community were standardized in the laboratory using sensory evaluation technique. Results of the present study indicated that all the developed products ranged between “like moderately to like very much” on the organoleptic parameters judged on nine point hedonic ranking scale. The highest scored were achieved by *murabba* of *aonla* (8.7 ± 0.35) and *ber* (8.8 ± 0.29) as compared to other products. Hence, it can be concluded that value added and preserved products have excellent acceptability if consumed in a meal.

Keywords : Underutilized foods, Sensory characteristics, Organoleptic and Value addition

Introduction

The world population (7.8 billion) is predicted to reach 9.6 billion people in 2050, rising at a rate of 1.03 per cent annually. India, which has a population of 1.38 billion, makes up 17.5 per cent of the global population. The greatest challenge of today is to provide this burgeoning population with stable, safe and nutritious quality food (UN, 2021). The significant challenge presently is to provide this growing population with reliable, safe and healthy food. In the current Global Hunger Index (GHI), India ranks 101 out of 116 countries, indicating a bleak picture in the fight against malnutrition, which may eventually, hinders socioeconomic progress (Gerber, 2020). Due to food scarcity, high prices and erratic supply of healthy food, finding economical and alternative sources of good and nutritious food has also become a critical concern in developing and underdeveloped nations. Food poverty can be dramatically reduced by utilizing the world's underutilized plants. A wide range of underutilized crops are mostly grown, commercialized and consumed locally. They are neither widely traded nor commercially cultivated. The benefits of these underused crops include in terms of ease of cultivation, hardiness and resilience to climate change compared to the major commercially cultivated crops. They also have therapeutic use and are extremely rich in significant compounds. As a result, their consumption may help to meet the nutritional demands of rural populations around the world, such as those living in vulnerable arid and semi-arid environments. Furthermore, the nutritional and therapeutic qualities of these crops are well known among the locals (Meena *et al.*, 2022). Underutilized edible plants are those that are minor, neglected, local, orphan and promising species that are used as food, fodder and medicines. However, their importance

and utilization have dramatically declined due to their restricted availability, short shelf lives, unknown nutritional benefits, low levels of consumer understanding and adverse reputations as “famine food” or “poor people's food.” Additionally, the industrialization of agricultural methods has severely eroded the gene pools of certain crops, making them “lost” or “neglected” crops (Williams *et al.*, 2002). Selling the products at the lowest market value just to survive economically is not sustainable. It can lead to stress on the land as well as on the farmer. “Value-added” is simply anything we can do to raise the value of our product in the market. Value-added practices are key to future of sustainable farming, because they enable growers to advance economically without having to “pump-up” the production of raw materials from the land. USDA defines value addition as a change in the physical state or form of the product (such as milling wheat into flour or making strawberries into jam) (Dalal *et al.*, 2019).

The *Indian gooseberry*, or *aonla* (*Emblica officinalis Gaertn*), is a significant fruit crop farmed throughout the nation under a variety of agro climatic conditions. In ancient literature, it is referred to as *Amritphal* and is considered a sacred tree. *Aonla* trees can also be found in the natural forests of Cuba, the United States, Pakistan, Sri Lanka, Malaysia, China, Java and the West Indies in addition to India. In Ayurvedic medicine, it is used to make *Triphala* and *Chyavanprash*. *Aonla* has now established itself as a significant fruit of the twenty-first century due to its hardiness, high productivity, nutritional and medicinal benefits and appropriateness for a variety of value-added products (Pathak, 2003). *P. emblica*, have gallic acid, alkaloids, ellagitannins, emblicanin A, vitamin C, and emblicanin B, flavonoids such as rutin and quercetin,

different types of biological molecules are also seen all together makes *P. emblica*, a very important medicinal plant. *P. emblica* has, anti-diabetic, analgesic, anti-microbial, diuretic, anti-mutagenic, anti-aging activities, UV protectant, and antioxidant. It can also enhance memory, also use in skin, respiratory and ophthalmic disorders and detoxification such as snake venom, are also focused (Borah *et al.*, 2022). *Ber* (*Zizyphus mauritiana Lamk*) is a member of the *Rhamnaceae* family and is commonly known as *jujube*. There are 125 different types of *ber* in India, where it thrives in semi-arid and dry regions. The cultivars *Umran*, *Kathapal*, and *Gola* are the most promising *ber* varieties in North India. *Ber* is a fruit that is underutilized and only available for a limited time, while being well-known for its rich flavour and great nutritional value (Dalal *et al.*, 2019). *Ber* (*Zizyphus mauritiana Lamk*) is one such fruit that has withstood such environmental conditions and is easy to cultivate. It grows even on marginal sites or in poor soils, where most other fruit trees fail to grow or perform poorly (Nandwani and Duquesne, 2014). *Zizyphus mauritiana* (*Ber*), a tropical fruit has been of high medicinal value. The seeds are used to cure eye diseases, leukorrhea, relieve thirst, an astringent tonic for heart and brain and have a sedative and hypnotic effect, useful in physical weakness, pain, insomnia and rheumatic symptoms. The roots used for the treatment of coughs and headaches whilst the bark has been used on boils and for dysentery. The leaves are antipyretic and used to promote the growth of hair. The dried fruits contain saponins, triterpenoids and alkaloids. The fruit has been used to help in digestion and treatment of tuberculosis. Other therapeutic properties of *ber* includes anodyne, anticancer, antidote, expectorant, pectoral, refrigerant, sedative, stomachic, styptic and tonic (Yadav *et al.*, 2020).

Materials and Methods

Procurement of raw material

The underutilized fruits such as *Amla* and *Ber* were procured from the field located at Krishi Vighyan Kendra, Bikaner, SKRAU, Bikaner. Other edible materials (perishables and non perishables) as per the requirement of the experiments were purchased from local market in single lots to avoid varietal variations.

Development and standardization of products

Product development is not a novel concept but on the eve of 21st century, it has taken on a new meaning in the agricultural sector of developing countries and there are many reasons for this. Perhaps, the most basic is product development - a general concept which is often associated with manufactured goods, the use of high technology and marketing in developed countries (Kotler, 1986). Standardization is the process of implementing and developing technical standards. It can help in maximizing compatibility, interoperability, safety, repeatability and quality (Roday, 2007).

Organoleptic evaluation

Organoleptic evaluation is the aspects of food, water or other substances that create an individual experience via senses. Organoleptic evaluation is a combination of different senses of perception which come into play for choosing and eating a food or it can be defined as a scientific discipline used to evoke, measure, analyze and interpret results of those characteristics of food as they are perceived by the senses of

sight, smell, taste and touch. Therefore, a selected panel of judges evaluated the sensory qualities for ensuring the acceptability for their sensory characteristics like colour, appearance, flavor, texture, taste and overall acceptability.

Selection of panel members

Threshold test was used for selection of panel members (Potter, 1987). Convenience, experience, knowledge, willingness, interest and sincerity on the part of panel members were also considered. Thus, ten members were enlisted in the panel comprises of staff members of the College of Community Science, SKRAU, Bikaner.

Preparation of score card

Score card was developed for assessing acceptability of samples on the basis of certain qualities looked for in food preparation such as color, appearance, aroma, texture, taste and over all acceptability. Nine point hedonic scale was provided to judges for scoring as suggested by Swaminathan (1987).

Method of evaluation

The processed samples were served to the panelists separately in similar containers with different codes for sensory evaluation. Care was taken to conduct the evaluation in an undisturbed environment as the environment may distract or influence the evaluation of judges. Various preserved and traditional foods such as *pickle*, *chutney*, *churan*, *murabba*, *sharbat*, *candy* and *jam* were developed using *Aonla* and *ber*.

Statistical analysis

The data obtained from various analyses was statistically analyzed by using suitable statistics to find out significance of the result (Gupta, 2002). In present study, results are expressed as mean. The obtained data were statistically analyzed by using SPSS (IBM SPSS statistics subscription new).

Result and Discussion

1. Standardization and sensory evaluation of developed products using *Aonla*

Aonla was used to prepare a variety of items. The samples of these commodities were developed, standardized and judged in the laboratory for their sensory qualities. There was a significant difference in the products overall acceptance at ($p < 0.05$).

(i) Pickle

To make *Aonla* pickle, freshly harvested *Aonla* was blanched, then cut and combined with spices. The data analysis shows that the product's overall acceptability score on a nine-point hedonic ranking scale ranged from 7.3 ± 0.18 to 8.4 ± 0.19 . The panellists found the pickle's sensory evaluation scores to be quite favourable.

(ii) Chutney

It is obvious that the chutney's total acceptance score on a nine point hedonic scale was 8.2 ± 0.27 , was acceptable by the panel members.

(iii) Churan (Mouth freshener)

The mouth freshener was produced in a laboratory by mixing spices with *aonla* pulp and then drying it to the

optimum level. The panelists assessed the product using nine-point hedonic scale based on its sensory characteristics. On a nine point hedonic scale, the total mean score of the

standardized recipe for *churan* (mouth freshener) gained 7.2 ± 0.21 . This indicates that product was acceptable by panelist.

Table 1: Mean sensory scores obtained by *Aonla* products

Products	Scores of sensory characteristics on nine point hedonic scale					
	Colour	Flavour	Texture	Taste	Appearance	Overall acceptability
1. Pickle	8.4±0.19	8.2±0.32	7.4±0.24	7.3±0.18	8.1±0.32	7.4±0.24
2. <i>Chutney</i>	8.4±0.25	8.3±0.19	8.0±0.33	8.0±0.16	8.1±0.22	8.2±0.27
3. <i>Churan</i> (Mouth freshener)	7.4±0.29	7.3±0.32	7.3±0.15	6.7±0.22	7.2±0.17	7.2±0.21
4. <i>Murabba</i>	7.9±0.21	8.7±0.67	8.1±0.31	8.9±0.51	8.7±0.31	8.7±0.35
5. <i>Sharbat</i>	7.7±0.48	7.9±0.31	7.8±0.22	7.7±0.48	7.3±0.42	7.7±0.39
6. Candy	8.9±0.56	8.3±0.48	8.1±0.32	7.7±0.23	7.8±0.19	8.4±0.25
7. <i>Jam</i>	8.4±0.39	8.1±0.28	8.0±0.12	8.2±0.19	8.3±0.26	8.3±0.39
F- value	19.09*	62.13*	42.81*	12.89*	21.3*	80.59*
C.D.	0.10*	0.14*	0.16*	2.73*	5.21*	1.40*

Values are mean ±SD of ten panelists *(P<0.05) Significant

(iv) *Murabba*

Murabba was produced in the laboratory for sensory evaluation and assessed by a panel of judges depending on their sensory qualities. The total acceptance of the standardized *murabba* was 8.7 ± 0.35 . This signifying that the judges "Liked very much" the product. *Murabba* scored the highest rating out of these seven products.

(v) *Sharbat*

The panelists assessed the product using a nine-point hedonic scale based on its sensory characteristics. On a nine point hedonic scale, the total mean score of the standardized recipe for *sharbat* gained 7.7 ± 0.39 . The panelists found sensory evaluation scores to be quite acceptable for *sharbat*.

(vi) Candy

It demonstrates that candy overall acceptance score was 8.4 ± 0.25 . This suggests that candy was liked very much by the panelists.

(vii) *Jam*

The overall score of the standardized recipe of *jam* was 8.3 ± 0.39 on a nine-point hedonic scale. This indicates that product was acceptable by panelist.

2. Standardization and sensory evaluation of developed product using *ber*

Ber fruit was utilized for the preparation of *jam* and *murabba*. Both the preserved products were developed and standardized in the laboratory and got evaluated by expert panel members for their sensory characteristics like colour, flavour, texture, taste, appearance and over all acceptability.

Table 2: Mean score obtained by *Ber* products

Products	Scores of sensory characteristics on nine point hedonic scale					
	Colour	Flavour	Texture	Taste	Appearance	Overall acceptability
1. <i>Jam</i>	7.3±0.47	6.9±0.43	7.5±0.47	7.1±0.39	7.2±0.33	7.0±0.36
2. <i>Murabba</i>	8.8±0.24	7.9±0.54	8.4±0.17	8.6±0.27	8.8±0.42	8.8±0.29

Values are mean ±SD of ten panelists

(i) *Jam*

Jam is a sweet concentrated product preserved by sugar in which the amount of sugar should not be less than 55 per cent (Siddappaa *et al.*, 1998). Excellent quality of *ber* jam was developed by utilizing pectin which is essential for *jam* making and unfortunately lacking in *ber*. The overall acceptability score of *jam* was 7.0 ± 0.36 signifying that it is acceptable by panel of judges.

(ii) *Murabba*

Murabba was the most acceptable product made by syruring the entire fruit. It was a glossy, sweet product with agreeable *ber* flavour. The fruit's immature stage and the syrup's concentration are the two key elements that influence the quality of *ber murabba*. The *ber murabba's* overall

acceptability rating was 8.8 ± 0.29 , that is close to "like extremely" on a nine-point hedonic scale.

Conclusion

Aonla was used to prepare a variety of items. *Aonla* pickle, *chutney*, *churan*, *murabba*, *sharbat*, candy and jam were developed, standardized and judged in the laboratory for their sensory qualities. The results of sensory evaluation were unveils that *Aonla murabba* gained (8.7 ± 0.35) highest rating, score on a nine-point hedonic ranking scale. There was a significant difference in the products overall acceptance at ($p < 0.05$). *Jam* and *murabba* were prepared and standardizing by the utilizing of *ber* was acceptable by the judges. Hence, it can be concluded that value added and preserved products have excellent acceptability if consumed in a meal.



Fig. 1a : Ber



Fig. 1b : Aonla



Fig. 1c : Aonla Pickle



Fig. 1 d : Aonla Murabba



Fig. 1e : Aonla Churan



Fig. 1f : Aonla Jam

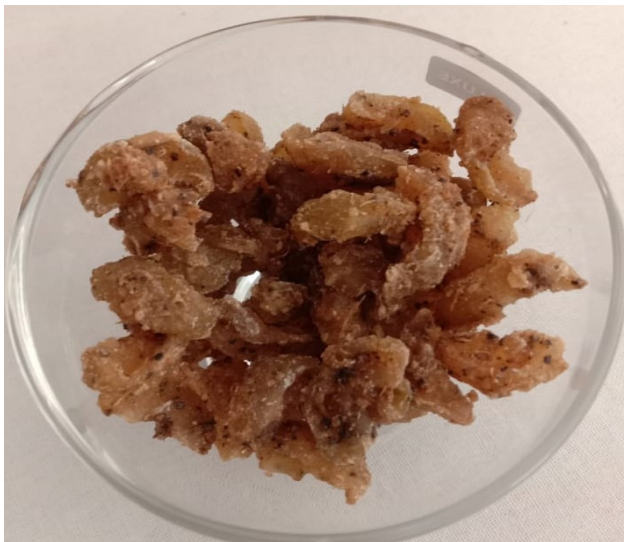


Fig. 1g : Aonla Candy



Fig. 1h : Aonla Chutney



Fig. 1i : Ber Jam



Fig. 1j : Ber Murabba



Fig. 1k : Aonla Sharbat

Fig. 1 (a-k) : Different Products of Ber and Aonla

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