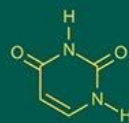


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Rani B Thallapally
Assistant Professor,
Department of Fruit Science,
Sri Konda Laxman Telangana
State Horticulture University,
Telangana, India

Significance of indigenous Indian arid fruit-ber

Rani B Thallapally

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Abstract

Ber (*Ziziphus mauritiana*, Lamk.), also known as the king of arid fruits, an indigenous fruit of India more closely associated with Indian culture and tradition. The ber is most common fruit tree all over the country particularly a successful crop in arid and semi-arid regions because of drought and salinity tolerance, high-yielding nature nutritional value, scope for value addition, low production cost, thus more income per unit area with low input. Hardy minor fruit suitable for cultivation in dry land conditions, where other fruit plants do not grow successfully. Ber is rich in ascorbic acid, carbohydrates and contain good amount of vitamin A and B complex, minerals like calcium, phosphorus and iron. Fruit has great nutritional and therapeutic value, considered to purify blood and aid digestion. Biodiversity International recommends consuming underutilized fruits to alleviate hidden hunger. Highly nutritious ber consumed fresh as well as dried or processed into delicious valued products.

Keywords: Arid, dry lands, indigenous, medicinal value, nutritional value, value products ziziphus

Introduction

India is blessed with climatic variations, which allow production of different types of fruits and vegetables. The Indian hot arid zone covers an area of 31.7 m ha. (12% of country's total geographical area) in states viz., Rajasthan, Gujarat, Punjab, Haryana, Maharashtra, Karnataka Telangana and parts of Andhra Pradesh and 7.03 m ha of cold arid zone in state of Jammu and Kashmir. In India the ber tree is sacred, known to removes sorrow, perhaps because of its sedative properties multiple nutritional and medicinal values both to humans and cattle. The Indian jujube is called as "Ber" in Hindi, "Regi pandu" in Telangana and Andhra Pradesh. In south Indian tradition, Bhogi Pallu is a ritual performed during festive occasion, Pongal in which, ber fruits and coinage are scattered over the heads of young children to protect them from evil spirits. Indian jujube is perennial drought hardy fruit species suitable for multiple environmental adversities besides low and erratic rainfall areas. It grows even on marginal lands or inferior soils where most other fruit trees either fail to grow or give very poor performance (Nandwani and Duquesne, 2014) [9]. Ber fruits are rich in ascorbic acid, carbohydrates and contains fairly good amount of vitamin A and B complex, minerals like calcium, phosphorus and iron. As fruits are highly perishable becomes over mature within two days at ambient temperature. Fruit has much scope for value addition (e.g., beverages, jams, cake, bread, porridge etc.). Ber is useful plant excellent tree for wasteland development in arid regions for economic upliftment of people in such areas.

Nutritional Significance

being a rich source of provitamin A, vitamin C and B complex, and also of Ca, K, Br, Rb, and La. Galactose, fructose, and glucose are the major sugars found in ber fruit. Fruits have a spongy, sweet-tasting pulp, and are an excellent source of ascorbic acid and carotenoids. (Pareek and Yahia, 2013) [15]. Predominant phenolics found in Ber relates to its major antioxidant activity. The three major phenolic acids identified in all four ber species were p-coumaric acid, vanillin and ferulic acids (Ayaz Ali Memon *et al.*, 2013) [11]. Kavitha and Kuna (2014) [5] studied the antioxidant activity of ber fruit and also formulated ber beverage. Jujube contains abundant ascorbic acid (192 - 359 mg/100 g) known to be a strong reducing agent and contribute to antioxidant activity. Krishna and Parashar, 2012 [7] reported that cv. Jogia had highest ascorbic acid (160.12 mg/100 g) followed by Kaithali, Mehrun and the author also reported that cv. Gola variety had 78.92 mg/ 100 g of ascorbic acid. The seed kernels are aphrodisiac (having substances arousing sexual desire) and root and bark are good for dysentery and diarrhoea.

Corresponding Author:
Rani B Thallapally
Assistant Professor,
Department of Fruit Science,
Sri Konda Laxman Telangana
State Horticulture University,
Telangana, India

Nutritive composition of ber fruit

Constituents: Amount (per 100 g)

Moisture (g): 81.6–83.0

Protein (g): 0.8

Fat (g): 0.07

Fiber (g): 0.60

Carbohydrates (g): 17.0

Total sugars (g): 5.4–10.5

Reducing sugars (g): 1.4–6.2

Nonreducing sugars (g): 3.2–8.0

Ash (g): 0.3–0.59

Calcium (mg): 25.6

Phosphorus (mg): 26.8

Iron (mg): 0.76–1.8

Carotene (mg): 0.021

Thiamine (mg): 0.02–0.024

Riboflavin (mg): 0.02–0.038

Niacin (mg): 0.7–0.873

Citric acid (mg): 0.2–1.1

Ascorbic acid (mg): 65.8–76.0

Fluoride (ppm): 0.1–0.2

Pectin (% dry basis): 2.2–3.4

Sources: Pareek and Dhaka (2008) ^[12], Pareek *et al.* (2001) ^[13].

Climate, Soils and Adoptability

Its ability to withstand drought makes it as a "king of Arid fruits". Ber grows under varying conditions of climate all over India, even at elevations up to 1,000m MSL. Ber is extremely drought hardy tree, it gives good production even without irrigation (Kumar *et al.*, 2008, Dayal *et al.*, 2010) ^[8, 2] can withstand extreme high temperature even up to 48°C. The tree prefers dry atmosphere for developing quality fruits. High atmospheric humidity and frost is distinctly disadvantageous. However, the trees continue to grow throughout the year under moderate south Indian climate. Flowering and fruit set adversely affects at temperature above 35°C during September to November, (Pareek 2001) ^[13].

Ber is not particular in its soil requirement. It can grow on a wide variety of soils, sandy, clayey, saline and alkali soils. It can be grown in an extreme moisture stress and in a wide range of soil upto an infertile one, which is unsuitable for major fruits and other crops. Once established, it can withstand even 21mm hos/cm salinity in soil. Gola ber is tolerant to high saline soils.

Notable adaptations and xerophytic characters of Ber are

1. Deep and extensive tap root system capable to penetrate through hardpan and draw water from deeper layers of soil. Besides, it drops its leaves in summer and thus conserves moisture by getting rid of transpiration mechanism.
2. Ability to become quiescent during summer which is characterized by shedding of leaves and growth cessation
3. Dark tan colour and hard and pubescent scales develop on the buds resulting into reduction in dehydration of buds; and
4. Ability to complete fruiting phase during the period of maximum moisture availability.
5. Sunken stomata, waxy coating and hairiness on leaves and thorniness reduce transpirational losses of water.
6. Due to these adaptive mechanisms, it is highly suitable to cultivate in arid and semi-arid conditions and can be

a very useful plant for economic upliftment of people in such areas. It is an excellent tree for wasteland development in arid regions. Utilization of vast land resources spread in arid areas, where several indigenous fruit crops like ber can successfully be grown.



Fig 1: Ber variety Umran

Suitable varieties for arid areas

Ber Gola, Seb and Mundia are suitable for extremely dry areas, whereas Banarasi Kadaka, Umran and Meharun for the dry regions. In northern India, Gola is earliest to ripen, Kaithali and Mundia are mid-season and Umran late cultivar. An early-maturing selection Gohma Kirti has been identified at Godhra (Gujarat). Thar Sevika and Thar Bhuvraj released by CIAH Bikaner.



Fig 2: Gola ber

Value Added Products: USDA defines value addition as a change in the physical state or form of the product. Value-added practices are key to future sustainable farming, because they enable growers to advance economically. Selling the fruits 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. (Nidhi Dalal *et al.*, 2019) ^[10]. During peak season, the price decreases and their surplus quantity in the market may result in spoilage of large extents, to extend the availability, the fruits can be processed into various products. The jujube fruit is usually consumed fresh and can also be processed into candy, jam, powder, and syrup or flour meal, or butter. However, various applications of jujube fruit for processed products require

fruits at varying levels of maturity, with different nutritional contents and bioactive compounds.

Fruits either harvested too early or too late are more prone to physiological changes and have a shorter storage life than fruits harvested at the appropriate stage of ripeness. Ber can be processed to prepare dehydrated ber, *murabba*, candy, pulp, jam, and ready-to-serve beverage. Fruit are rich source of ascorbic acid (vitamin 'C'), protein and mineral nutrients (Fe, Ca and Mg).

The ascorbic acid content of small ber fruits reported 183.42 ± 0.19 mg/100 g (Kavitha, *et al.* 2014) [4]. Ber can be processed into various forms of Value added products. Liquid forms include unfermented beverages (pure fruit juice, fruit juice beverage, squash, cordial, crush, fruit juice concentrate, RTS, nectar, syrup, sherbet, barley water, carbonated beverage) and fermented beverages (alcohol, vinegar), puree, sauce, ketchup etc. Semi-solid forms include pulp, jam, jelly, marmalade and chutney. Solid forms include canning, drying, preserves, candy and pickling (Devi *et al.*, 2015) [3]. Vitamin c enriched Ber honey and ber millet cookies are now in trend. Ber fruit is generally eaten fresh and is a rich source of ascorbic acid, essential minerals, and carbohydrates (Pareek *et al.* 2002) [14]. It is richer than apple and mango in vitamin C, protein, and minerals, and contains higher phosphorus and iron than

orange (Khera and Singh 1976) [6].

Singh and Pathak (2016) [17] formulated ber candy from different varieties. They studied the physico-chemical characteristics of different cultivars viz., Illaichi, Ponda, Umran, Gola, Banarsi Karaka and Narendra Ber Sel-2. Both the physico-chemical composition of ber fruit and organoleptic quality of candies Banarsi Karaka was found the best among all cultivars for making of candy.

Ber fruit juice was also used for the preparation of vinegar. It was produced by fermentation by two step process i.e. alcohol and acetic acid fermentation which was later analysed for physico-chemical properties. Due to its high antioxidant activity it is known as functional vinegar (Vithlani and Patel 2010) [18]. Prepared Chuhura-like product from ber by osmo-air drying process

Z. mauritiana is called as Masau in Zimbabwe. Fruits form part of the family diet and generate additional income by selling at local markets. Surplus fruits are sun dried or converted into various products such as porridge, traditional cakes, mahewu, and also fermented to produce a spirit called Kachasu. Fermented fruit pulp contains ethanol. Nayanga *et al.*, (2008) [11] did a survey of the traditional processing techniques of masau using a questionnaire and two focus group discussions in Mudzi, Mt. Darwin, and Muzarabani districts in Zimbabwe.

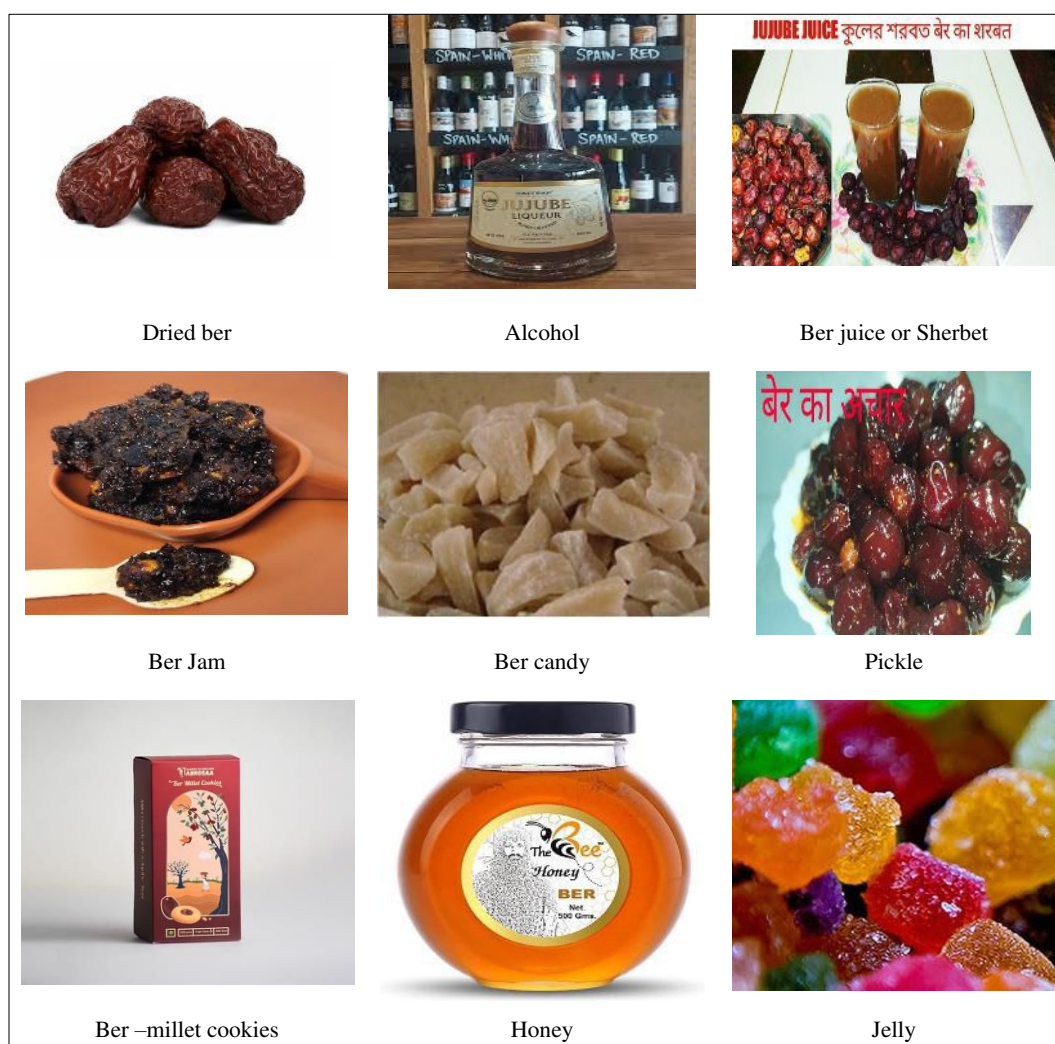


Fig 3: These are the reasons why the ber has become significantly important in Indian Horticulture in recent years.

Conclusion

Ber, or Indian jujube, is a versatile and resilient fruit tree that thrives in India's arid and semi-arid regions, making it highly valuable for environmental and economic development. Its rich nutritional profile, particularly in vitamin C, B-complex vitamins, and essential minerals, supports both human health and livestock. The tree's ability to withstand drought and poor soil conditions highlights its adaptability, while its role in traditional rituals, especially in southern India, adds cultural significance. Moreover, the scope for value-added products, such as jams, beverages, and candy, offers promising opportunities for farmers, contributing to sustainable agriculture and economic upliftment in arid regions.

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