

The Neglected Potential of Underutilized Fruit Crops

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ABSTRACT

India is known for their huge diversity of fruits. Global diversity in fruits and vegetable crops is estimated to be 3400 species. The Hindustan center has 344 species of fruits. India is one of the 17 mega-biodiversity hotspot regions of the world. Their cultivation is very restricted and they grow mainly as wild. Being tolerant to biotic and abiotic stresses, these fruit crops are suitable for growing in drought-prone areas. The varying weather conditions of this country provide a suitable environment for growing a variety of fruits. However, these species have under-exploited potential to ensure food security, nutrition, health, income generation and environmental services. Most of the underutilized indigenous fruit crops are considered under protective food throughout India because of their medicinal value and phytochemicals minerals. The value-added products of these fruits need a focused approach to reach the national and international markets. Therefore, emphasis must be placed on the rigorous study of these crops' conservation and nutritional characterization so that the future food basket can be widened to enhance its functional and nutritional values. The Indian Government policies and international centers are supporting these crops by spreading the awareness and significance of the underutilized crops which increase in Indian economy, food security, nutrition, health and income generation. A holistic approach is hence proposed which includes both in-situ and ex-situ conservation strategies.

Keywords: Underutilized fruit crops; Tropical fruits; Nutritional importance; Food security

INTRODUCTION

Underutilized crops mean to enhance agrobiodiversity and climate resilience. The term underutilized species has been defined in several ways. One definition is those species either cultivated or wild that have a great potential for agricultural development and production diversification, thereby ensuring food security, preserving cultural diversity and traditions and generating income for people living in severe marginal environments. Hence, it is difficult to define what qualifies as an 'underutilized species. The terms such as 'underutilized', 'neglected', 'orphan', 'minor', 'promising', 'niche' and 'traditional' are often used interchangeably to characterize the range of plant species with under-exploited potential for contributing to food security, health (nutritional/medicinal), income generation and environmental services [1].

Underutilized fruits are those fruits that are not grown commercially on a large scale, cultivated, traded and consumed

locally are termed as underutilized fruits. Efforts have been made to describe underutilized fruits systematically and comprehensively. The book has been written to compile the latest information and technologies used in the current scenario for the production of underutilized fruits. Underutilized fruits are cultivated or found in the wild, traded and consumed both locally and internationally. They are good sources of both the macro and micro-food elements. Consumption of wild fruits reduces the risk of several diseases like diabetes, cancer, coronary heart disease and neurodegenerative ailment. Many wild fruits notably, Amla, Harida, Bel and Elephant Apple have been exploited from the wild for centuries across the Indian subcontinent on account of its food and medicinal properties. Therefore, their consumption has shown great potential to address hidden hunger by ensuring that communities are well-nourished. Underutilized plant species have local or regional importance, but generally lack national recognition and appreciation. The underutilized crops are the plant species

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traditionally used for their food, fiber, fodder, oil or medicinal properties [2].

Underutilized fruits are equally important and nutritional sound *vis a vis* commercially grown fruit crops under the present scenario. The term 'underutilized' crop has been defined in various ways in world literature, most of these have been given importance to ethnobotanical features, among others pertaining to the ancient cultural heritage of the locality, multiple uses, traditional crops in localized areas lesser known and neglected by agricultural research and development agencies. Since time immemorial, edible wild fruits have played a very crucial role in supplementing the diet of the people of the Indian Subcontinent. Species are often well-accepted through long traditional use, which has led to the development of stable informal germplasm supply pathways for their distribution and regeneration. Long familiarity means poor farmers hold extensive germplasm and knowledge of these species [3].

LITERATURE REVIEW

Micronutrient deficiency is an identified health issue and approximately over two billion people are directly affected worldwide. Lack of essential vitamins and minerals, which are demanded in small quantities by the body for proper growth and development is identified as a micronutrient deficiency and referred to as 'hidden hunger'. Many species have excellent nutritional profiles, with high protein, vitamin and mineral contents that can contribute to alleviating malnutrition hidden hunger. Often, species appear highly diverse morphologically,

with a wide genetic resource base assumed to be available for harnessing in potential improvement programs. This wide gene pool also provides opportunities for the improvement of related major crops. The importance of these lesser-known fruits is increasing day by day because people realized the importance of new useful terms such as caloric sweetness, insecticide compounds and medicinal value. Most of the underutilized fruits are rich sources of vitamins (ascorbic acid, thiamine, niacin, pyridoxine and folacin), minerals, fat, protein and dietary fiber [4].

While it is true that these underutilized fruits are generally low yielding, it is also true that for one reason or another, these species have been ignored by virtually all stakeholders involved in the field, from researchers and extensionists to farmers, policy and decision-makers, donors, technology providers and finally consumers. In consequence, not enough is known about their agronomy, cultivar selection, yield improvement, post-harvest practices, potential markets and commercialization processes. Underutilized fruits include species with potential for commercial development, species with potential for home garden use, with potential use for nutraceutical purposes (medicine and cosmetics) or as a source of substance for pest control or natural growth regulators, as timber, fuel, oils, gums and waxes for the industry, as livestock feed and their intrinsic value as genetic resources (Table 1).

Table 1: Different underutilized fruit crops and their botanical description.

Family	Common name	Botanical name
<i>Arecaceae</i>	Salak	<i>Salacca edulis</i>
<i>Anacardiaceae</i>	Jamaica plum	<i>Spondias purpurea</i>
	Hog plum/Ciruela/Yellow mombin	<i>Spondias mombin</i>
	Marking nut/Bibba/Bhilawa	<i>Semecarpus anacardium</i>
<i>Capparidaceae</i>	Ker	<i>Capparis decidua</i>
<i>Burseraceae</i>	Pilnut	<i>Canarium ovatum</i>
<i>Berberidaceae</i>	Indian barberry/Kingoda/Kilmora	<i>Berberis aristata</i>
<i>Clusiaceae</i>	Gamboge tree	<i>Garcinia cambogia</i>
	Manney apple	<i>Mammea americana</i>
	Cowphal	<i>Garcinia cowa</i>
<i>Cactaceae</i>	Indian fig	<i>Opuntia ficus-indica</i>
<i>Dilleniaceae</i>	Elephant apple	<i>Dillenia indica</i>
<i>Elaeagnaceae</i>	Gewain/Silver berry	<i>Elaeagnus latifolia</i>
<i>Ebenaceae</i>	Tendu	<i>Diospyros melanoxylon</i>

	Black sapote (not true sapote)	<i>Diospyros digyna</i>
<i>Euphorbiaceae</i>	Latka	<i>Baccaurea samiflora</i>
<i>Elaeocarpaceae</i>	Ceylon olive	<i>Elaeocarpus serratus</i>
<i>Juglandaceae</i>	Wing nut	<i>Pterocarya pterocarpa</i>
<i>Lecythidaceae</i>	Para nut/Brazil nut	<i>Bertholletia excelsa</i>
<i>Meliaceae</i>	Langsat	<i>Lansium domesticum</i>
<i>Moraceae</i>	Timla	<i>Ficus auriculata</i>
	Wild Himalayan fig/Bedu	<i>Ficus palmata</i>
<i>Myrtaceae</i>	Surinam cherry/Brazil cherry	<i>Eugenia uniflora</i>
	Jaboticaba	<i>Myrciaria cauliflorasyn</i>
<i>Passifloraceae</i>	Giant granadilla	<i>Passiflora quadrangularis</i>
<i>Pinaceae</i>	Chilgoza nut (not belong to angiosperms)	<i>Pinus gerardiana</i>
<i>Rosaceae</i>	Sohiong khasi cherry	<i>Prunus nepalensis</i>
	Yellow Himalayan raspberry	<i>Rubus ellipticus</i>
	European raspberry	<i>Rubus idaeus</i>
	Black thorn sloe	<i>Prunus spinosa</i>
	Indian hawthorn or Nepalese firrthorn or Ghingharu	<i>Pyracantha crenulata</i>
<i>Rutaceae</i>	Kichili	<i>Citrus maderaspatana</i>
<i>Salvadoraceae</i>	Grape of the desert/Tooth brush tree	<i>Salvadora oleoides</i>
<i>Sapindaceae</i>	Spanish lime	<i>Melicoccus bijugatae</i>
<i>Sapotaceae</i>	Indian butter tree	<i>Diploknema butyracea</i>
	Star apple	<i>Chrysophyllum cainito</i>
	Green sapota	<i>Calocarpum virideae</i>
<i>Saxifragaceae</i>	Blackcurrants	<i>Ribes nigrum</i>
	Red currants	<i>R. rubrum</i>

Characteristics and potential uses of some underutilized fruit crops

Lasora (*Cordia myxa* L.): Eulogized as Gonda, Lasora, Lehsua, cherry of desert, Assyrian Plum, Bird's Nest Tree or Bhokar belongs to the Boraginaceae family and is grown across India except for the high hills and temperate climates. Quick growing used as a windbreak, dioecious, broad leaved, less acidic fruit tree having xerophytic characters. Fruits have medicinal values as anti-helmetic, diuretic, demulcent expectorant and minerals,

crude fiber, protein, ascorbic acid, ash and vitamins, which represent essential nutrients for human health and for curing certain human ailments. Tender fruit is used as a vegetable purpose and pickles. *Cordia alliodora* good source of timber and biomass production in forest [5].

Kair (*Capparis decidua*): *Capparis decidua* Forsk belongs to the Capparidaceae family and it is locally known as Kair, Ker, Karil Teent, Della and Neptiin. It is an indigenous, multipurpose small woody perennial much-branched, leafless bushy shrub

widely grown without much care on farm boundaries, orans, gochars and wastelands tracts of arid and semi-arid regions. Its xerophytic characteristics, such as deep root system, scanty foliage, mucilaginous sap and tough conical spine, make it an ideal plant for stabilizing sand dunes and controlling soil erosion by wind during the hot desiccating summer in the Thar desert of Western Rajasthan.

Khejri (*Prosopis cineraria*): Khejri or Jand/Shami belongs to the Leguminosae family and is considered the wonder tree, nature's gift, the king of the desert and the golden tree. It is a desert dwelling tree that is the lifeline tree of the Indian Thar desert because every part of the tree is used to improve the socio-economic life of the local people [6].

Chironji (*Buchanania lanzan*): Chironji belongs to family of Anacardiaceae. Chironji found culinary uses both in sweet acid as a delicacy. Chironji is low in calories but extremely high in protein and dietary, fiber which keeps your hunger pangs at bay, leading to satiety and eliminating the need to eat more often. A grown-up child who has left breast milk should be given a sweet bolus prepared of Chironji kernels, madhuka (*Glycyrrhiza glabra*) honey, parched paddy and sugar candy. Kernels are made into a powder and used with milk as an aphrodisiac and in case of fever and burning sensation. Powder of the bark mixed with honey is useful in blood dysentery.

Seabuckthorn (*Hippophae salicifolia*): Eulogized as Bragmphal or Amil or Tarwar or Gold mine of wasteland in the cold desert or storehouse of vitamins or Holly plant of hilly region belong to the family Elaeagnaceae. Typical dry temperate plant, thorny and dioecious. Suitable plant for pharmaceutical, cosmetic and food industries. Oil is rich in vitamin E and β -carotene and is used as folk medicine in China, Tibet and India. Seabuckthorn can fix atmospheric nitrogen through Frankia symbiosis. Vit C content 3-4 times higher than aonla and 10-15 times than kiwi [7].

Noni (*Morinda citrifolia*): Eulogized as 'Hog apple or Indian mulberry'. The underutilized medicinal fruit plant belongs to the family of Rubiaceae. A sacred plant in Ayurveda and mentioned in ancient texts as Ashyaki means longevity in the Sanskrit language. Highly useful from therapeutic and nutraceutical values. Chemical constituents of fruits are useful against high blood pressure, respiratory problems and immune deficiencies. Active ingredients in fruit: Xeronines and Proxeronine. Crops grow well in tropical and deciduous forest and are found in the Western Ghats. Tolerant to wet, dry, acidic, alkaline and saline soils. Costliest drink among non-alcoholic beverages. Health amrut: Beverage of noni fruit extracts with pure honey (Brand name-Dancing Heart).

Miracle fruit (*Synsepalum dulcificum*): It is a plant which belongs to the Sapotaceae family known for its berry that, when eaten, causes sour foods (such as lemons and limes) to subsequently be consumed to taste sweet. This effect is due to miraculin. Common names for this species and its berry include miracle fruit, miracle berry, miraculous berry and sweet berry. Historically, it was also used to improve the flavor of soured cornbread but has been used as a sweetener and flavoring agent for diverse beverages and foods, such as beer, cocktails, vinegar

and pickles. It is used in the treatment of hemorrhoids used in the treatment of male infertility and other health benefits include helping in the treatment of obesity and dysgeusia and improved well-being hyperuricaemia, hyperlipidemia and anti-tyrosinase [8].

Elephant apple (*Dillenia indica*): The elephant apple (*Dillenia indica*) is a tropical tree, distributed in various countries of the South Asian region including India. The elephant apple belongs to the family Dilleniaceae, commonly known as an elephant apple a vital, medicinal plant readily available in Assam, North East India. The immature fruits are used to make seasoning and sauces because of their acidic taste and mature fruits are used for making sauces, jam and pickles. The *Dillenia indica* are rich in medicinal and phytochemical properties which can reduce free radical and other types of cancer like breast cancer in women. Cure stomach related problems, protects kidney, constant energy levels, delayed aging, fights infections, good for eye health, and lower blood pressure. It reduces blood pressure and control hypertension.

DISCUSSION

Functional properties of underutilized fruit crops and importance

Underutilized fruits for nutritional security: Vitamins are organic substances present in small amounts in many foods. They are required for carrying out many vital functions of the body and many of them are involved in the utilization of the major nutrients like proteins, fat and carbohydrates. Vitamin C deficiency causes scurvy characterized by weakness, bleeding gums and defective bone growth ascorbic acid occurs widely in plant foods particularly in underutilized fresh fruit and vegetables, especially in green varieties. Riboflavin as a part of coenzyme is essential for several oxidation processes inside the cell and is concerned with energy and protein metabolism. Some of the clinical symptoms attributed to inadequate intake of this vitamin in the diet are the soreness of tongue (glossitis), cracking at the angles of the mouth (angular stomatitis), redness of the eye and burning sensation in the eyes and scaliness of the skin in the region between the nose and angles of the lips. A large number of minerals and trace metals are present in the body. Some of these form parts of body structural components and some others act as catalytic agents in many body reactions. Bones and skeletons are made up of mainly calcium, magnesium and phosphorus and iron is a component of blood. Minerals like zinc, molybdenum, copper, manganese and magnesium are either structural parts or activate a large number of enzyme systems. Fruits are rich with antioxidants that help in lowering the incidence of degenerative diseases such as cancer arthritis, arteriosclerosis, heart disease, inflammation, brain dysfunction and acceleration of the aging process. Antioxidants are substances that can prevent or delay oxidative damage of lipids, proteins and nucleic acids by reactive oxygen species, which include reactive free radicals such as superoxide, hydroxyl, peroxy, alkoxy and nonradicals such as hydrogen peroxide, hypochlorous, etc.

Ecological and environmental conservation: Many of the underutilized fruit crops species can tolerate drought, the shallowness of soil profile, winter and summer hardiness and can be grown in the wasteland. The tribal inhabitants of Western Ghats, Maharashtra and North Eastern States of India were traditionally reliant on non-timber forest products and favored local fruit species like tamarind (*Tamarindus indica*), jackfruit (*Artocarpus heterophyllus*), Indian gooseberry (*Emblica officinalis*), ber (*Zizyphus mauritiana*), etc. instead of arable food crops apart from mango and cashew, for establishing agri-horti-forestry for their livelihoods. The various underutilized fruits enrich the areas of India. However, despite rich germplasm in India, the development of standard varieties was limited. With a wide degree of adaptability and high tolerance, they can thrive well under adverse climatic and edaphic conditions. These fruits also serve a potentiality in sustainable agriculture. Hence, research and development work, farmers' awareness and the feasibility of the cultivation of these less-known fruits are to be given due consideration [9].

Value addition of underutilized fruits: Accurate statistics about quantity produced and processed is unavailable for underutilized fruits because a sizeable quantity of the fruits produced is self-consumed, exchanged or sold locally. The majority of fruit species are not cultivated on a large-scale or commercial basis but rather are grown in the wild or in home gardens or field boundaries. Normally, the fruits are collected from the wild forest and sold fresh on a seasonal basis, with limited processing. The volume processing is very high for all the species, as it refers to primary processing, which mainly involves the removal of pulp and drying. The socioeconomic status of rural families can be improved through the value addition of underutilized fruit.

CONCLUSION

Horticulture is the fastest-growing sector in India and contributes immensely to poverty eradication and nutritional security. Though minor fruits are popularly known as 'less known fruits' minor fruits are reservoirs of several essential nutrient elements, vitamins and minerals and bioactive compounds. These fruits have great values both in nutritional

and medicinal properties their consumption has shown great potential in addressing hidden hunger by ensuring that communities are well-nourished. They have a greater potential to cure several deficiency disorders and also increase immunity against diseases. Awareness is created among the consumers, which will subsequently benefit to fight several nutrition related problems. Need to increase the area and production of these lesser known fruit and their processed products. Government and non-government organizations should play a vital role in the production, marketing, value addition and popularization of these minor fruits. Hence, research and development work, farmers' awareness and feasibility for cultivation of these underutilized fruits are to be given due consideration.

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