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Underutilized fruits of lower Brahmaputra valley region of Assam

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Abstract

The lower Brahmaputra valley region of Assam is suitable for growing a large number of diversified plant species and considered one of the rich reservoirs of different minor fruits. These lesser-known fruit plants are traditionally been esteemed for their medicinal and nutritional values by various communities of this region from time immemorial, majority of them remained confined in semi-wild or semi-domesticated conditions and are rarely known in other parts of the country. It lays emphasis on exploiting the potential usefulness of such valuable resources as they play a significant role in combating the challenges of food and nutritional security of rural populace. In the present study, an attempt has been made to explore, identify and document potential minor fruit species and their usage among the indigenous people of lower Assam, which is home to a number of ethnic tribes of the Indo-Mongoloid races. This paper deals with 29 species of underutilised fruits belonging to 18 families and 21 genera and highlighted the succinct description of these valuable plant wealth

Keywords: Underutilized fruits, Medicinal value, therapeutic property, conservation

Introduction

Assam is the most populous state of the North Eastern Region (NER) of India which is situated between 24° and 28°18' N latitude and 89°4' and 96° E longitudes. The rainfall in Assam is high but its distribution is not uniform. The mean annual maximum temperature ranges between 23°-31 °C and minimum temperature varies from 10°-25 °C. The lower Brahmaputra valley is the largest agro-climatic zones of the state covering the maximum number of districts. The inhibitor of the region is a mixture of different ethnic communities and tribes and majority of the people are engaged in agriculture. The valley is bestowed with a wide array of genetic resources in terms of both cultivated and wild species of various indigenous crops. The rural people invariably rely on these plant resources for subsistence, food security and health and they use these edible fruit plants to maintain a strong agriculture-based social structure and a parallel life support system. These edible fruit plants have significant relevance in the life of rural people, many of them have economic, social and religious significance and are traditionally been esteemed for their utilization in terms of medicinal, therapeutic and nutritional values. They have an under-exploited potential to contribute to food security, nutrition, health, income generation and environmental services (Srivastava *et al.* 2017; Krishna *et al.* 2019) ^[11, 8]. Most of them are rich sources of antioxidants, polyphenols, flavonoids vitamins, minerals and other nutrients, which can be an alternative source to combat hidden hunger caused by micronutrient deficiencies mainly vitamins and minerals (Khoo *et al.* 2008; Ashrafuzzaman *et al.* 2021) ^[7, 1]. These indigenous fruits are also a good source of feed and nutrition for birds and wild animals.

The underutilized fruits are neither grown commercially on large scale nor traded widely, their cultivation, consumption, and trading are more geographically and quantitatively limited than those of the major fruits (Saúco 2013) ^[10]. These plants have many advantages in terms of being easier to grow, hardy and can produce good crops even under adverse conditions (Rathore 2001) ^[9]. These plant species are well adapted to low-input agriculture, the marginal and waste lands can be utilised for growing these low-input demanding underutilized fruit plants since they are easily adapted to fragile environments, resistant to biotic and abiotic stresses and have the potential to contribute to agro-ecosystem stability. Despite the huge potential and recognized importance, this valuable plant wealth has not received the desired attention and remained underutilised and underexplored because of underestimation of their potential uses, lack of complete botanical information, inadequate study on commercial exploitation, and is gradually declining due to rapid disappearance of the ecosystem, and

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habitat destruction (Dandin and Kumar 2016) [4]. As a result, some of them are now becoming endangered and on the verge of extinction. Therefore, emphasis on conservation, evaluation and utilisation of these novelties is recognition of the need for reinforcing nutritional as well as ecological security. In the present study, an attempt has been made to identify, document and present a succinct description of underutilized fruits of the lower Brahmaputra valley region of Assam along with their traditional uses.

Materials and Methods

The study was undertaken during 2017-18 and 2018-19 in different seasons by conducting field surveys in three districts of the lower Brahmaputra valley region of Assam namely Barpeta, Bongaigaon and Chirang. The homestead gardens of villagers were selected to create an inventory of underutilized fruit plants. Traditionally, resourceful people, village headmen and learned old folks were consulted to divulge information about different indigenous fruits having ethno-medicinal values. For cross-verification and collection of supplementary information, several rounds of group discussions and group meetings were held with the local people of different villages in the study area.

A questionnaire and interview schedule were prepared to collect data such as vernacular name, edible parts used, time of availability, taste, mode of use, and medicinal property etc. The horticultural potentials of the plants were assessed based on the domestication of the plants and their contribution to livelihoods. The indigenous fruit plants surveyed with the key informants during the walks on homestead gardens were identified with the assistance of custodian farmers and traditional rural practitioners and further authenticated with the help of relevant scientific literature which includes Kanjilal *et al.* (1934–1940) [6]; Bor 1940 [3]; Balakrishnan (1981–1983) [2] and Patiri and Boarh (2007) [5].

Results and Discussion

The present study could document a total of 29 species of underutilised fruits belonging to 18 families and 21 genera.

Rutaceae was the most dominant family with 4 taxa followed by Euphorbiaceae, Clusiaceae and Myrtaceae with 3 taxa each. Among the genera, *Citrus*, *Garcinia* and *Syzygium* are the largest genera having 3 species each whereas, *Phyllanthus* and *Terminalia* come next with 2 species in each genus. These fruit plants remained confined in semi-wild or semi-domesticated conditions and have been used by ethnic communities and tribes for several generations. The indigenous traditional knowledge about the uses of these plant species is preserved from generation to generation which is very essential to be used in the near future. These fruit trees are perennial in nature, require comparably less care and their cultivation has additional benefits such as reducing environmental pollution, improving ecological balance, aiding in soil and water conservation, and enhancing the beauty of the surroundings.

These underutilized fruits have great socio-economic significance, they are nutritionally very rich, and many of them also possess medicinal properties. The majority of the fruits are eaten raw when ripe, and some are processed into pickles and preserved products. In the case of *Rubus ellipticus*, *Syzygium cumini*, *Flacourtia jangomas*, *Annona reticulata*, *Syzygium jambos*, the sweetish pulp or fleshy palatable pericarp of the ripe berries or drupes is consumed. Fruits of *Dillenia indica*, *Garcinia cowa*, *Spondius pinnata*, *Averrhoa carambola* are often cooked or used in culinary preparation. Some species like *Citrus jambhiri*, *Elaeocarpus floribundus*, *Garcinia pedunculata*, *Phyllanthus acidus*, *Tamarindus indica* are often used to make pickle. These indigenous fruits are growing in natural conditions and are free from the danger of insecticides or pesticides. The time of availability of most of these underutilized fruits coincides with the onset of the rainy season. These fruits have good demand in the local market and fetch sometimes good market price.

The underutilized fruits of the present study area are arranged alphabetically with their scientific name, common name, family, time of availability, taste and mode of use enlisted in Table 1.

Table 1: Inventory of underutilised edible fruit plants of the lower Brahmaputra valley region of Assam

Sl. No.	Scientific Name	Common Name	Family	Time of Availability	Taste	Uses
1	<i>Aegle marmelos</i> (L.) Corr. Serr.	Bael	Rutaceae	March –June	Sweet	Mature fruits are eaten raw and used for stomach trouble, constipation etc.
2	<i>Averrhoa carambola</i> L.	Kordoi	Averrhoaceae	November– March	Sour	Mature fruits are eaten raw or processed as pickle, used to treat jaundice and kidney stones
3	<i>Artocarpus lakoocha</i> Roxb.	Bohot	Moraceae	May–July	Sweet and Sour	Ripe fruit eaten raw, Male flower heads are used to make pickle
4	<i>Annona reticulata</i> L.	Atlas	Annonaceae	November– December	Sandy –Sweet	Fruits are eaten raw, considered to be vermifuge/ anthelmintic
5	<i>Baccaurea ramiflora</i> Lour.	Leteku	Euphorbiaceae	June – August	Sweetish sour	Fruits are eaten raw, used in the treatment of skin diseases. Seeds are useful in asthma & bronchitis
6	<i>Citrus grandis</i> (L.) Osborne	Robab Tenga	Rutaceae	September– December	Sweetish sour	Ripe fruit eaten fresh, used to treat skin problems, headaches and coughs
7	<i>Citrus jambhiri</i> Lush.	Gool Nemu	Rutaceae	July – November	Sour	Fruits are eaten raw or as pickle. Considered to have antioxidant and antibacterial properties
8	<i>Citrus medica</i> L.	Jora Tenga	Rutaceae	September– December	Sour	Fruit taken raw, has anti–inflammatory properties
9	<i>Dillenia indica</i> L.	Outenga	Dilleniaceae	September– December	Sour, slightly sweet	Fruit (fleshy calyx) eaten raw as well as cooked or processed as pickles, jam. Used to treat cough, fatigue, abdominal pain etc.
10	<i>Elaeocarpus floribundus</i> Blume.	Jolphai	Elaeocarpaceae	October– January	Sour	The mature fruits are eaten raw, cooked or pickled
11	<i>Flacourtia jangomas</i>	Poniol	Salicaceae	May–July	Sweet	Fruits are eaten raw, used against Jaundice, diarrhoea &

	(Lour.) Raeusch.					dysentery
12	<i>Ficus racemosa</i> L.	Dimoru	Moraceae	April–July	Sweet	Young shoots, leaves and green fruits are eaten, considered good for liver
13	<i>Garcinia cowa</i> Roxb.	Kau Thekera	Clusiaceae	July–August	Sour	Ripen fruits are first dried and then used in culinary preparation or preserved as pickle
14	<i>Garcinia lanceaeifolia</i> Roxb.	Rupahi thekera	Clusiaceae	June–July	Sour	The red ripe fruit is eaten fresh, considered highly medicinal
15	<i>Garcinia pedunculata</i> Roxb. ex. Buch-Ham	Bor Thekera	Clusiaceae	June–July	Sour	Ripe fruits are eaten raw. Dried fruit slices are used as medicine for dysentery
16	<i>Menya spinosa</i> Roxb. ex Link	Kotkora	Rubiaceae	October–December	Sweetish sour	Ripe dried fruits are eaten with salts
17	<i>Melastoma malabathricum</i> L.	Phutkola	Melastomataceae	November–January	Sweet	Ripe fruits are eaten raw, roots and leaves are used as medicine
18	<i>Phyllanthus emblica</i> L.	Aamlokhi	Euphorbiaceae	May – November	Astringent	Fruits are eaten raw or processed as pickles, considered highly medicinal
19	<i>Phyllanthus acidus</i> (L.) Skeels	Pora Amlokhi	Euphorbiaceae	June–July	Astringent	Fruits are eaten fresh or as pickles, used to improve vision and memory and to treat diabetes and cough
20	<i>Rubus ellipticus</i> Smith	Jutulipoka	Rosaceae	November–January	Sweet	Ripe fruits are delicious and eaten, considered to have astringent and anti-diuretic properties
21	<i>Syzygium cumini</i> (L.) Skeels	Kola Jamu	Myrtaceae	June–July	Sweet	Fruits are eaten raw, Considered to have anti-microbial properties, and used to treat digestive ailments
22	<i>Syzygium jambos</i> L.(Alston)	Bogi Jamu	Myrtaceae	May–July	Sweet	Ripe fruits are eaten fresh, used against diarrhoea & dysentery
23	<i>Syzygium malaccense</i>	Paani Jamu	Myrtaceae	June–July	Sweet	Ripe fruits are eaten raw
24	<i>Spondius pinnata</i> (L.f.) Kurz.	Amora	Anacardiaceae	September–December	Sour	Fruits are taken raw when ripe, unripe green fruits are made into curry, and also form good pickles. Seeds are also eaten, Fruit eating helps in purification of blood
25	<i>Trapa natans</i> L.	Soru singori	Trapaceae	November–December	Starchy sweet	The seeds are eaten either raw or roasted
26	<i>Terminalia bellirica</i> Roxb.	Bhumura	Combretaceae	December–February	Astringent	Fruits are taken raw. Highly medicinal and used in the preparation of ‘Trifola’
27	<i>Terminalia chebula</i> Retz.	Silikha	Combretaceae	October–December	Bitter/ Astringent	Both unripe and ripe fruits are eaten raw. The fruits are boiled and sun dried and preserved for medicinal use, usually chewed after meal as digestive
28	<i>Tamarindus indica</i> L.	Teteli	Fabaceae	October–February	Sour, slightly sweet	Unripe and ripe fruits are eaten fresh. Used to prepare jelly, pickles and chutneys. Used for stomach disorders, scurvy, & cough problem
29	<i>Zizyphus mauritiana</i> Lam.	Bogori	Rhamnaceae	January–February	Sweetish sour	Fruit is eaten fresh, Pickles are also prepared from fruit

Conclusion

Although the underutilised fruit species has vast potential in terms of food, nutritional and environmental security, this valuable plant resource has not yet received the desired attention and remained underexplored. The emphasis should be given on the exploitation of genetic resources of underutilized fruits which may be utilized for crop improvement as a source of resistance, hardiness and vigour. These edible fruits have good demand in the local market and there is ample scope for establishing small-scale fruit processing units to produce value-added products and by-products. The evaluation of nutraceutical value of these fruit will help to open up new avenues for future research in this field. However, these valuable plant wealth are gradually becoming endangered and on the verge of extinction due to habitat destruction. Therefore, improvement of existing traditional homestead gardens is the recognition of the need for proper utilisation and development of this resource. Furthermore, popularization and systematic cultivation are necessary for the complementary conservation of these valuable plant wealth of this region.

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