



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(7): 3329-3334
© 2022 TPI
www.thepharmajournal.com
Received: 27-05-2022
Accepted: 30-06-2022

Konjengbam Ramit Singh
Department of Horticulture,
School of Agricultural Sciences
and Rural Development. NU:
SASRD, Medziphema Campus,
Nagaland, India

Animesh Sarkar
Department of Horticulture,
School of Agricultural Sciences
and Rural Development. NU:
SASRD, Medziphema Campus,
Nagaland, India

A review: The significance and status of native fruits under NE region

Konjengbam Ramit Singh and Animesh Sarkar

Abstract

NE region which has favourable climate and ecosystem is widely known for its diversity along with underutilized fruits which consist of several rich vitamins and minerals consumed by the native people also providing a wide range of employment opportunities. Though there is potential for development of horticultural field with its wide variation of topographical and agro-climatic variance, however the region is yet to harness the capacity. In this paper, a review of the characteristics of native crops and their post-harvest usage is provided.

Keywords: Employment, horticulture, native, northeast region, underutilized fruits

Introduction

The NE of India comprises of eight states-Manipur, Arunachal Pradesh, Meghalaya, Assam, Nagaland, Mizoram, Sikkim and Tripura; with mean average temperature ranging from 18-29 °C, while winter temperature varies from 9-24 °C. These regions are known for their unique habitats, ecosystems and living, which sums up for their vast diversity (Sarmah and Deka, 2012) [4].

Tribals of several cultural groups like Garo, Khasi, Monpas, Naga, Karbis, Jaintia Kuki, Mizo, Manipuri, Dufla, Apatani Chakma, Adi, Mishing and many others chiefly follow the practice shifting cultivation. Most of wild fruits and underutilized crops are consumed for daily diet among the tribal people of the region and are also sold in the nearby local markets. These underutilized fruits are known for their rich content of minerals and vitamins (Fe, Ca, Mn, P, organic acid); they are also high sources proteins, fats and carbohydrates. Tribal communities devour minor fruits either fresh or in the form of pickles, beverages or cooked alongside other dishes. Several species are known for their medicinal value, while others are commonly used commercial purposes for example: timber, dye, production of tannin, phytochemicals, etc. with increase of urbanisation along with shorter period of *jhum* cycle leading to different kinds of erosion require indigenous practises for conservation of environment in-situ and ex-situ as well. (Lakshman Chandra, 2017) [2].

Northeast region status

All Northeast states have recorded considerable rise in fruit production excluding Sikkim state. However, the factual concern for the fruit crops under the NE is the low and stunted productivity (7.69 tonnes ha⁻¹) which is beneath the national level (10 tonnes ha⁻¹). Every state in Northeast with exception to Assam (12 tonnes ha⁻¹) and Tripura (16 tonnes ha⁻¹) have reported higher productivity than the national level. In fact, the congenial agro-climatic condition of the region expected to favour the higher productivity as being recorded so far. More concern is that the fruit productivity of the North Eastern states has been either declining or remaining stagnant during the preceding decades.

One major cause for the low productivity may be due to the traditional way for cultivation of these fruits, which lack commercial and modern methods of production. Secondly, with shortfall of irrigation and adequate water facility; thirdly, there is lack of inorganic fertilizers and inputs; finally with fluctuations in temperature during period of rainfall restricts potential for pollination and sweeps off the pollen. Extra special attention are required for increasing fruit production through contribution of proper planting materials, aiding farmers in capacity and skill building and encourage them to adopt modern and improved production methods for increase in productivity.

Corresponding Author
Konjengbam Ramit Singh
Department of Horticulture,
School of Agricultural Sciences
and Rural Development. NU:
SASRD, Medziphema Campus,
Nagaland, India

Table 1: Area and production of the horticultural sector under the NER

State	2009-10		2010-11		2011-12		2012-13		2013-14		2014-15	
	A	P	A	P	A	P	A	P	A	P	A	P
Arunachal Pradesh	72.00	107.90	72.00	107.90	85.11	308.86	86.86	312.24	89.09	321.26	90.00	331.40
Assam	117.30	1575.50	137.50	1763.50	142.76	1851.77	150.71	2073.82	144.68	2007.80	155.51	2242.74
Manipur	38.40	281.90	68.70	286.30	49.47	405.85	51.93	440.59	54.05	515.69	55.63	533.60
Meghalaya	32.90	294.80	30.20	241.90	32.31	300.42	33.15	316.57	35.30	348.00	36.33	377.25
Mizoram	27.10	328.30	27.00	211.50	43.68	275.71	49.68	292.95	57.55	343.90	60.27	350.91
Nagaland	30.80	223.70	18.20	151.30	33.70	347.68	37.23	275.95	40.56	411.00	40.56	411.00
Sikkim	12.20	18.50	17.50	25.80	13.40	22.47	14.65	24.02	16.02	24.05	17.38	19.68
Tripura	36.90	573.80	40.80	643.90	54.50	644.35	60.12	697.87	68.38	786.35	71.90	805.77

Note: A: Area in '000 ha, P: Production in '000 MT. Source: Horticultural Statistics at a Glance 2018.

Significance of horticulture fruits

With diversity of agriculture, it acts as a major plan for agricultural development in India and value of horticultural crops as a means of diversification and generating of employment opportunities. Apart from that, it also assists in expansion and growth of agro based industries along with value addition. Even though, there is high potential for forming and development of horticulture sector with its wide variation of topographical and agro-climatic variance, however the region is yet to harness the capacity.

Horticultural crops have the ability to generate more employment, boost trade and commence foreign exchange. Commercially grown crops usually have value, while some special varieties of crops can be grown in degraded and marginal soil condition. Though fruits tend to easily perish and demands proper storage and transport handling along with facilities, such needs are lacking in the north-eastern region. Farmers usually harvest the crops in timely intervals and the produce are sold off immediately after harvesting to local or nearby markets. In the absence of such adequate facilities for value addition and processing, the farmers are forced to sell off their produce at cheaper rates; moreover, function of marketing channels has been a primary drawback in the NE region. Saha (1973) [3] suggested that horticulture sector presented a bright future in the hill areas of the NER, with favourable climatic and soil condition providing excellent environment and scope for growing wide range of varieties of fruits (orange, lemon, pineapple and banana) for commercial ground.

The broad potential of horticultural fruits requires to be utilized and more emphasis should be focused on cultivation of more value and low volume crops. For such purposes proper packaging of input mix, genuine location specific agricultural technology, enhancement of road communication, well established market processing and cold storage facilities etc. are the basic necessity. In reference with the present condition, the significance of horticultural crops has improved significantly as a end result of reduced availability of per capita land for cultivation and farm labour, increased per capita income and consumption of processed fruits and vegetables. Furthermore, in comparison with the average labour requirement for field crops i.e. 150-200 man days, horticultural fruits require more labour i.e., about 450-2, 500 man days annually.

In the hilly terrains and topography, horticulture farming is measured to be a sustainable substitute to *jhum* cultivation. The investigations carried in the region demonstrated that profits from the horticultural farming are found to be reassuring as compared to slash and burn practise. So, in short the horticultural division requires the support of wide-ranging marketing channels and network and appropriate arrangement

and set-up in the interest of widening the economy & improving ecology of the region.

Distribution of Indigenous Fruit according to the North East Region

A vast figure of appetising indigenous fruits are naturally scattered among humid tropical to temperate altitude of NER (Lakshman Chandra, 2017) [2].

1. Mizoram

Garcinia lancaefolia, *Phyllanthus acidus*, *Musa rosea*, *Mangifera sylvatica*, *Passiflora edulis*.

2. Arunachal Pradesh

Baccaurea sapida, *Actinidia callosa*, *Musa ornata*, *Musa velutina*, *Sterculia hamiltonii*, *Castanopsis indica*, *Mangifera sylvatica*, *Lithocarpus* spp., *Nephelium lappaceum*, *Rubus niveus*, *Pyrus pashia*, *Livistonia jenkinsiana*, *Viburnum foetidum*, *Citrus medica*, *Garcinia lancaefolia*, *Dillenia indica*, *Artocarpus chaplasha*, *Machilus edulis*, *Malus baccata*.

3. Sikkim

Docynia indica, *Actinidia strigosa*, *Machilus edulis*, *Bassia bytyracea*, *Musa sikkimensis*, *Spondias axillaries*, *Baccaurea supida*, *Elaeagnus latifolia*.

4. Nagaland

Garcinia lanceafolia, *Myrica fraquhariana*, *C. ichangensis*, *Passiflora edulis*, *Citrus aurantium*, *Musa magnesium*, *Phyllanthus acidus*, *Malus baccata*, *Juglans regia*.

5. Tripura

Baccaurea sapida, *Citrus macroptera*, *Zizyphus funiculisa*, *Antidesma bunius*, *Averrhoa carambola*, *A. ghasaembilla*, *Grewia sapida*, *Grewia hirsute*, *Psidium guineens*, *Physalis minima*, *Elaeocarpus floribundus*, *Rubus ellipticus*, *Citrus maxima*, *Carrissa carandas*, *Dillenia indica*.

6. Assam

Citrus lemon, *Citrus maxima*, *C. jambhiri*, *C. macroptera*, *Citrus megaloxycarpa*, *Artocarpus lackoocha*, *Dillenia indica*, *C. assamensis*, *Phyllanthus acidus*, *Averrhoa carambola*, *Baccaurea sapida*, *Elaeagnus lalifolia*, *Myrica* spp., *Flacourtica indica*.

Given below are generic descriptions of some indigenous fruits commonly found in NER:

1. Scientific name: *Citrus macroptera*.

Common name: Hatkara/satkara.

Mostly available in semi wild and wild phase in Manipur,

Meghalaya and Manipur and Mizoram. Finest quality of fruits is produced in Khoibu village under district of Chandel. The tress is tall, heavily foliaged, hardy and thorny in nature with thick petiole larger than the blade in comparison. Fruits are similar in shape like bael fruit with 10-12 segments and lifespan of upto two months. It is considered as a threatened citrus species with shifting cultivation is the main culprit for the loss of this rare species. The native people usually use this fruit to preparation of pickles using the peel of the fruit.

2. Scientific name: *Cirtus medica*.

Common name: Tanyum (Arunachal Pradesh).

This shrub is grown mostly in road sides, degraded areas and forests. It is shrub nearly similar to the Assam lemon plant in morphology and is tolerant to pests, diseases and insect; it can also be used as a possible dwarf rootstock for mandarin. Fruits are generally green during undeveloped stage and turn yellow during full ripe phase unlike Assam lemon, where fruits usually have blunt tapering towards apical end thus developing a typical projected nipple-like figure. The peel is thick in nature, henceforth; pulp is reduced and has lesser juice content.

3. Scientific name: *Citrus deumana*

Common name: Rabab

The tree grows in abandoned areas mostly where fruits are roundish to ovoid in shape around and are generally yellow in colour at full ripened stage and green in immature. The fruit pulps are whitish pink in colour indicates content in good amount of juice and can be used in the preparation of squash.

4. Scientific name: *Musa velutina*.

Common name: Kodok.

This plant is distributed naturally in marshy and swampy catchment sites and alongside springs and stream. Plants are usually dwarf in height while the sizes of bunch and fingers are slightly smaller. The average number of fingers per bunch is 26.67 while finer per head is 5.33. Ripened fruits are usually aromatic and sweet in nature. Peduncle grows upright and pulp is more seeded. There are two kinds of varieties that were observed under West Siang in district of Arunachal Pradesh- Dogyo and Dogli. The flower fingers and bract of variety Dogli possess pinkish red in shade while fingers tend to be red colour both in ripen and unripe phases. However, in contrast with Dogyo variety bract is observed as brown while fingers are light green in colour during the immature period then turn to yellow at ripened stage. The native people are very fond of both strains; however, their availability is quiet rare.

5. Scientific name: Citrus spp.

Common name: *Elaichi nimbu*.

This species of citrus shows excellent performance degraded forest lands. The plant is a shrub, with similar morphology to Assam lemon but vary in fruit size and shape. Fruits are mostly green during unripen period and turns yellow at full ripe stage. Juice is highly acidic. Fruits are slightly tapering at apical end forming a nipple-like shape while the juice is highly acidic in nature. There are kind variants under this species-rough skin and smooth skin.

6. Scientific name: *Lithocarpus* spp.

Common name: Empe.

This fruit is a bulky tree usually grown in river basin areas,

catchment and degraded sites comprising of calcareous soil. Fruits are usually available in bunches and are known for their high fat content, it can be consumed raw or roasted and can be preserved as dry fruit. It becomes accessible in the market during months of July-august.

7. Scientific name: *Livistonia jenkinsiana* Griff.

Common name: Toku/Tayek.

These are slow growing palm trees with palmate leaves that extend upto 15m having bluish gray colour fruits. Tayek or Toku plants are mostly cultivated by the native people of Galo-Adi tribe of Arunachal Pradesh for their leaves, which are used for roof purpose, while immature ones are used for preparation of broom and fruits are either used for chutney delicacy or eaten in raw form. The berries of this fruit are found to be ash-blue in colour during the ripen stage.

8. Scientific name: *Musa ornata*.

Common name: Kolu.

This fruit is found naturally in degraded lands, marshy areas near springs and streams. The peduncle develops velvety and downy texture while the finger has grayish-green shade, which develops to slightly yellow at matured stage. The average figure of finger per hand is 13, number of hand per bunch accounts for 4 and finger per bunch in total is 50. The pulp is numerously seeded, edible and enjoyed mostly by kids, while it also serves as pig feed at times.

9. Scientific name: *Passiflora* spp.

Common name: Passion Fruit.

Passion fruit has a great scope and potential in the NE region. In recent times, it has been grown in areas of under Nagaland, Mizoram, Sikkim & Manipur and under Meghalaya it natively known as 'Soh-brab'. The *P. edulis*, known as purple passion fruit is a perennial, woody vine, which has an oval shaped fruit which develops purple colour at time of full ripened. The *P. edulis* f. *flavicarpa*, commonly yellow passion fruit consists of vigorous vine and is differentiated by character of their pinkish, purplish or reddish colour in leaves, tendrils and stem. It has a decent source of vitamin C and A and can be consumed raw or added in fresh drinks; other times it is used for aroma in making jams or ice-cream purposes. In small scale, it can be used of preparation of nectar and squash. Due to its excellent taste, it is used to improve the whole quality of products. It requires sub-tropical to tropical climate and can be cultivated upto a sea level of 1600, and grows well in heavy loam to sandy loam soil condition with proper drainage with 6-7pH level.

The two prevailing varieties: Yellow (*Passiflora edulis* var. *flavicarpa*) & Purple (*Passiflora edulis*) are usually propagated through cuttings or seeds. For cultivating trough cuttings, the developed and matured consisting of length 30-35 cm long, having 2-3 internodes of thickness similar to a pencil should be used and planted in polythene or nursery beds consisting of proper potting materials. Cuttings made out of roots are transplanted in field after a time period of 3 months at a spacing of 4.5m plant to plant and 2m of row to row. When plants are propagated through seedlings, seeds are extracted from the ripened fruits then grown in nursery beds under shade for suitable environment. With development of two to three leaves, the germinated seedlings should be transferred to polythene bags; furthermore, they should be moved and planted into the field by 3-4months old. Key insects include mealy bus, aphids and fruit fly; these pests can

be controlled with spaying of Malathion 50 EC @ 2ml/litre of water. Major diseases include brown spot, wilt and damping off, for brown spot control spraying of Bavistin or Dithane M-45 or @ 2.5 g/litre of water. Fruiting usually starts by 10 months, fruiting for yellow type starts during months of August to December; while purple type starts from March to May are observed and reported under hilly condition in Meghalaya with average yield ranges between 8-10 tonnes/ha.

10. Scientific name: *Nephelium lappaceum* Lamk.

Common name: Tader.

These plants are found to be naturally distributed in the virgin forest or wild areas and is said to be similar to family of litchi fruit, acts as a rootstock for litchi and commonly also known as rambutan. The fruits are larger in size which consist of long spines, and is edible in fully developed stage meanwhile the aril is used for preparation of squash which is white in colour. Ripened or fully matured fruits are usually eaten raw, while the seeds on the other hand are kidney shaped.

11. Scientific name: *Averrhoa carambola* L.

Common name: Carambola

Natively known as 'Soh Pырshong' in Khasi.

This fruit belongs to family oxalidaceae and is commonly grown all over NE region. This fruit has angular and elongated shape similar to a star comprising of star like cross section with five carpels and popularly called as star fruit, due to its unique shape. The acidity in taste is due to presence of calcium oxalate in crystals in the flesh, which gets liquefied in the saliva giving form to oxalic acid. It is a short trunked, slow growing tree, heavy canopy and densely branched. The matured ones rarely cross 25-30 feet with spreading up to 20-25 feet. The colour of the fruit is pale-deep yellow with a smooth waxy cuticle along with 5-6 protruding longitudinal ribs. The seeds tend to lose their viability after being removed from the flesh, ripened ones are consumed raw or used in processing of drinks or squash products.

12. Scientific name: *Emblica officinalis*.

Common name: Aonla.

Aonla is an indigenous fruit which is known for its high source of vitamin C and its purpose in ayurvedic treatment and has similarity with general gooseberry. Due to their likeness, this fruit is also known as 'Indian gooseberry'. This fruit is under family of Euphorbiaceae, and is a medium sort tree usually grown in sub mountainous and plain areas. It is also grown in NE region, where the trees under these regions are found to be tolerant to low temperature and start bearing fruits by month of December to January. These fruits are tiny in size and appearance, weighing about 4.72 to 5.25g, diameter of 2.23 cm, length 2.07 cm, seed weight of 0.87 g and pulp recovery % up to 81.48.

13. Scientific name: *Elaeagnus* spp.

Native name: Soh-shang.

It belongs to family *Elaeagnaceae*, and has two kinds of species *Elaeagnus* viz *E. pyriformis* and *E. latifolia* and is commonly grown in the north east region. The species are scattered in hilly terrains about 1500m in the Himalayan regions, while in the NE regions, it is usually grown in hill topography of Nagaland, Jaintia and khasi hills of Meghalaya and Sikkim state and also Sibsagar under Dikho valley of Assam. This is a big evergreen creeping woody shrub with thorny rusty shiny scales, with hermaphrodite flowers and

pollination is carried out by bees. *E. pyriformis* fruits are pyriform along with pointed slightly on either ends, while fruits of *E. latifolia* are ovate which turns pink dark during ripened stage. Flowering usually starts by September-December while fruits turn light pink by harvesting period of march-april. Fruits are quite perishable but can be stored under room temperature for 3-5 days. These fruits can be consumed either by making pickles or processed products as refreshing drinks or jam or eaten in raw form along with salt as a delicacy. These fruits are known to be rich with minerals and vitamins (A, E and C), some bio active compounds and flavonoids. They also contain essential fatty acids which are known for their ability to reduce cancer. These plants thrive best in well drained soils, grows well moist or dry soil conditions and tolerable to drought. These plant types are able to perform symbiotic association with some N fixing bacteria. Propagation of this plant is carried out either by cutting or seed.

14. Scientific name: *Garcinia lancaefolia*.

Native name: Bhava in Hindi.

Chenkek in Mizoram.

This is a rare fruit, native of Mizoram under the family of Clusiaceae, and is commonly grown as a secondary crop along with major crops like banana, arecanut and citrus. When the fruit is fully ripened, it is similar to citrus fruit internally while resembles tomato externally. Natives of Mizo, tend to be like both in ripen and unripen stages. The fruit is known for its rich content of Vitamin C, nutritious content and bitter with acidic taste and is used for medicinal value e.g., stomach disorder. This is an evergreen plant, medium sized with drooping branches having 3-5m length with lance like leaves structure. Blooming period is usually between February-march, flower are usually clustered or solitary at times and ranges from pinkish to yellow consisting of long pedicels. Fully ripened ones tend to be pink red colour and resemble tomato, with fleshy, rind, smooth hard with tight juice pouches. Juice pouches differ between 4-9 with each pouch consisting of one seed, the seeds are tightly packed with placenta. The ripening period for this fruit is usually about 100-120 days and is usually harvested around April-June. Average yield ranges from 200-250 fruits per plant, however, plant initiate their fruiting after 3-4 years from planting period and fetch good market value at the same time. The plants are commonly propagated by suckers, a year old sucker are usually used as materials.

15. Scientific name: *Dillenia indica* L.

Common name: Elephant apple.

Native name: Otenga.

This fruit is said to be originated Indonesia, belonging to family Dilleniaceae and is available commonly found in Assam and rest of NE region. Elephant apple tree is a spreading type arranged with white flowers which are known for its sweet fragrance globose type fruits which has small brown seeds along with serrated leaves. The fruit is edible and greenish yellow coloured; immature or unripen fruits are used in preparation of chutney and pickle. The pulp is known to be juicy and aromatic and well known for their acidic nature.

16. Common name: Hisir

Hisir is a very lofty tree growing upto height of 50 - 70 m, in dense virgin forest areas. The berries are small and green coloured during unripe / immature stage which turns to dark

brown when ripened. Immature berries are consumed raw by children whereas during the over-ripened stage, it is used in pickle preparation and chutney. It has a peculiar strong pungent odour during its fully matured stage.

17. Scientific name: *Malus baccata*.

Common name: Crab apple.

Crab apple tree is a medium to small sized approx. 6m, consisting of alternate toothed with small leaves and striking fruits and flowers. The fruits are known to be abundant of juice and pectin, which are widely used to preparation of pickles and jellies. These plants are propagated with ease through cuttings or grafting methods; while some of its varieties are used as rootstocks for domestic apple. This tree is commonly used as pollinizers in orchards, such as apples.

18. Scientific name: *Citrus indica*

Common name: Tanaka

Native name: Memong Narang, meaning ghost (Memang) and orange (Narang).

Tanaka fruit is usually considered as the most ancient and primitive, possibly the descendant of cultivated citrus species (Singh 1981). This is a common fruit in the Garo hills of Meghalaya and mostly used by the native tribes for curing of chronic diseases. The fruits are dried and fresh raw fruits are used for dealing with several deadly communicable diseases as they contain medicinal property-small pox, while the fruits are taken as a remedy for diseases like jaundice, stomach related illnesses among livestock and human beings.

Flowering period is usually between months of September-January, a time period where commonly all citrus species undergo timeout, cause of technical cut in winter season. Flowering time - September to January, a time span when in general all citrus species undergo time-out phase due to critical decrease in winter condition. For this reason, the clarity of the species is still preserved, however tanaka has no value as a trading and commercial fruit.

19. Scientific name: *Citrus assamensis*

Ada jamir, Ginger citrus is focused mostly grown in 4 to 5 locations in Khasi hills of Meghalaya and Cachar area under Assam. The tree figure is medium to tall, with modest foliage, fruits are pear in shape and thorn and has pungent with diverse fruit and leaf odour similar to ginger however it is of no commercial value.

20. Scientific name: *Citrus megaloxycarpa* Lushaigton

Common name: Sour pummelo.

Native species of North East India which is non-edible and area the under this species is unceasingly declining due to farmer's reluctance to grow them. Acidity in the fruit extract is claimed to be very high.

21. Scientific name: *Citrus ichangensis* Swingle

The distribution of this indigenous fruit is limited to Khasi hills of Meghalaya and mostly in the hills of Nagaland; the seeds are very large in size without pulp. The fruits are smooth, medium in size but non-consumable.

Table 2: Post-harvest usage of some native fruits

Drinks	<i>Dillenia indica</i> , <i>Aegle marmelos</i> , <i>Grewia sapida</i> , <i>Diospyros lotus</i> , <i>Myrica esculenta</i> , <i>Garcinia lanceafolia</i> , <i>Feronia limmonia</i>
Jam	<i>Averrhoa carambola</i> ; <i>Emblia officinales</i>
Preserve	<i>Cornus capitata</i> , <i>Citrus medica</i> , <i>Docynia hookeriana</i> , <i>Corlaria nepaulensis</i>
Jellies	<i>Ficus hispida</i> , <i>F. semicordata</i> , <i>Ficus auriculata</i> , <i>Garcinia lanceafolia</i> <i>Flacourtia jangomas</i> .

Source: Lakshman Chandra De. 2017^[2]. Valuable Indigenous Fruit crops of NER of India.

Table 3: Medicinal use of some indigenous fruits

<i>Cordia myxa</i>	Fruit is diuretic, astringent, demulcent, expectorant and anthelmintic
<i>Aegle marmelos</i>	Unripened fruits are used in dysentery and act as astringent
<i>Eugenia janbolana</i>	Fruits are anti-diabetic in nature
<i>Emblia officinalis</i>	Fruits are used for their cooling agent, laxative, astringent Diuretic
<i>Randia duemontorum</i>	Fruit are expectorant, diaphoretic and emetic
<i>Feronia elephantum</i>	Fruits are used for their antiscorbiotic, alexipharmic and tonic Properties
<i>Musa velutina</i>	Fruit used to fight against stomach disorders
<i>Garcinia lanceafolia</i>	Helps to reduce stomach disorders
<i>Citrus indica</i>	Fruits act as tonic for stomach disorders
<i>Antidesma brunius</i>	Helps to reduce syphilic ulcers
<i>Litsea cubeba</i>	Helps in paralysis
<i>Hydnocarpus kurzii</i>	Helps to cure leprosy

Source: Lakshman Chandra De. 2017^[2]. Valuable Indigenous Fruit crops of NER of India.

Table 4: List of characteristics of some indigenous fruits under NER

Sl. No.	Fruit Species	Aridity	T.S.S (%)	Vit. C (mg 100 ml juice pulp)	Total sugar	pH	Reducing Sugar (%)
1.	<i>Phyllanthus acidus</i>	2.27	4.68	21.15	--	4.15	--
2.	<i>Elaegnus latifolia</i>	2.16	9.10	21.15	6.09	--	1.40
3.	<i>Baccaurea sapida</i> (Roxb.)	1.93	8.2-14.11	--	--	--	--
4.	<i>Myrica</i> sp. Big sized fruit, green colour	4.31	5.7	17.63	2.48	-	0.97
5.	<i>Myrica</i> sp. small sized fruit, pink colour	2.44	6.20	4.03	7.68	--	3.57
6.	<i>Myrica</i> sp. small sized fruit, green colour	4.83	6.30	28.20	2.18	--	0.83
7.	<i>Dillenia indica</i>	1.20	4.80	--	--	--	--
8.	<i>Prunus nepalensis</i>	0.13	16-23.20	8.81-12.34	3.53-10.37	--	--
9.	<i>Emblia officinalis</i>	--	--	--	--	--	--

Source: Lakshman Chandra De. 2017^[2]. Valuable Indigenous Fruit crops of NER of India.

Table 5: Physico-Chemical characteristics of some lesser known fruits of NER

Local name	Diameter (cm)	Length (cm)	Pulp weight (g)	Fruit Weight(g)	TSS brix	Juice content (ml fruit)
<i>Belam</i>	2.70	3.24	10.83	13.87	8.0	-----
<i>Tader</i>	3.93	6.00	----	247.55	----	-----
<i>Hisir</i>	2.11	3.27	5.61	8.73	---	---
<i>Empe</i>	2.53-2.0	2.59	---	7.66	--	---
<i>Kolu</i>	2.09	11.0	16.03	30.37	--	---
<i>Kodok Dogyo</i>	3.02	9.05	18.125	37.7	9.6	--
<i>Kodok Dogli</i>	2.87	8.4	17.54	36.90	15.5	---
<i>Rabab Tenga</i>	11.40	11.05	474.55	575.00	10.2	151.50
<i>Elaichi Nimbu-Rough skin</i>	7.60	8.95	151.00	252.50	6.00	35.00
<i>Elaichi Nimbu-Smooth skin</i>	6.95	8.38	120.29	204.76	6.5	27.27
<i>Tayek Ekse</i>	2.43	2.40	5.13	10.04	--	--
<i>Tanyum</i>	6.63	9.03	92.44	173.31	6.7	16.90

Source: Lakshman Chandra De. 2017 ^[2]. Valuable Indigenous Fruit crops of NER of India

Constraints

Even though, underutilized crops do hold good value and hold more opportunities, given below are some constraints with the present status of them-

- There is a huge gap along with lack of technical supply and machineries in enhancing the fruit production and increasing the yields;
- Lack of attention for the native crops programmes related to horticulture.
- Lack of proper arrangements and very limited role by financial institutions in initiation of agro based and horticulture based units.
- Limited and inadequate technology for value addition purposes.
- Highly neglected research under indigenous horticultural crops.
- Absence of unique, innovative and distinct technology for enhancing and improving the productivity.
- Unavailability of proper planting resources and supplies.
- There are no awareness programmes or initiative taken in regard for making the natives know about the nutritional and medicinal value and the economic use of these indigenous crops.
- Lack of inadequate and limited marketing facility along with poor storage, transportation, processing & infrastructure.

Conclusion

NE region is gifted with lavish flora and fauna conditions along with amiable climate which is suitable for several crop cultivation. Fruits such as litchi, mango, pineapple, litchi are usually preferred as table fruits due to their easy and convenient way of consuming. Wild or native fruits are commonly not the first preferences for people as they tend to have bitter or unappealing frutiness, while some fruits are easily perishable in nature and are difficult in storing them during their fresh stage. While few of them are unedible and intolerable in their fresh form due to their excessive acidic nature or strong pungent savour. These indigenous fruits are yet to be discovered and explored in a way so that the native people are given due credit for their conservation practises all these decades. Although, taking in consider their nutritional and balanced quality, these underused fruits bear tremendous potential to enhance and boost the food calamity and also provide a cure for common health issues for the population. Moreover, planting material and seed quality of the native are difficult for production, while some varieties faced issues regarding export and transportation. With increase in production and area of these crops would not only save

monetary expense on import and provide balanced and nutritional diet but also uplift and enhance the economy of the region. This may also increase opportunities for youth employment related to agriculture-based industries such as packaging, storing, transportation and preservation etc. this would bring light to those underutilised crops and popularise them towards the market level.

References

- Horticultural Statistics at a Glance. Department of Agriculture, Cooperation & Farmers' Welfare. Ministry of Agriculture & Farmers' Welfare. Government of India, 2018.
- Lakshman Chandra De. Valuable Indigenous Fruit crops of North Eastern Region of India. International Journal of Research in Applied, Natural and Social Sciences. 2017 March;5(3):21-42.
- Saha N. The Economics of Shifting Cultivation in North-East India, 1973, 49.
- Sarmah Dinesh, Kr Deka Parag. Horticulture in north-east India: Strengths and prospects. The Asian Journal of Horticulture. 2012;7(1):221-228.
- Singh B. Establishment of First Gene Sanctuary for Citrus in Garo Hills. Concept Publishing Company, New Delhi, 1981.