

Overview of underutilized horticultural crops

in North-Eastern region

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The study discusses the rich biodiversity and potential of underutilized horticultural crops in the North-eastern region of India. The region, covering only 7.7% of India's total geographic area, is home to more than 50% of the country's biodiversity, with over 60% of the region's crops being underutilized. The study underscores the importance of these underutilized crops in addressing food security, agrobiodiversity conservation, and a more resilient agricultural system. It also highlights the therapeutic diversity of these crops, their potential for value-addition and post-harvest management, and their significance in traditional medicine systems. The significance of these underutilized crops in addressing various health issues and contributing to traditional medicine systems is emphasized, along with their potential for income generation for local farmers and sustainable agricultural practices. Additionally, the study addresses the pivotal role of Krishi Vigyan Kendras (KVKs) in fostering awareness among farmers regarding the importance and conservation of these crops.

Keywords: KVKs, Therapeutic diversity, Underutilized crops, Value-addition

THE Northeastern region of India, consisting of eight states viz. Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim is located between latitudes 21°51' and 29°5' and longitudes 85°5' and 97°5' E. The region boasts of its rich biodiversity accommodating a large variety of flora and fauna, and represents an important part of the Eastern Himalaya and Indo-Burma global biodiversity hotspot amongst the 36 recognized global biodiversity hotspots. Northeast region occupying only 7.7% of India's total geographic area, covers more than 50% of the biodiversity in the country, out of which 31.58% is endemic. The tropical and subtropical temperature and alluvial soil of the Brahmaputra and Barak plains, as well as the temperate climate of the hills with laterite and sandy soil, support a diverse range of tropical and temperate horticultural crops having high nutritional value. Apart from the nutritional value, many local horticultural crops are used for medicinal purposes, income generation and poverty alleviation programmes in the rural areas. In 2021, approximately 2.3 billion people were affected by moderate or severe food insecurity due to limited access



to nutritious and affordable food options. Plants play a vital role in securing human nutrition worldwide, comprising about 84% of the human diet. Nonetheless, there is an increasing dependency on a restricted set of crop species for sustenance. Despite the existence of approximately 50,000 edible plant species known to humanity, only a minor fraction, roughly 150 to 200 species, finds utilization as food. Strikingly, a mere 15 crop plants contribute to 90% of the world's food energy intake. From this, over 60% is derived from just three major crops: rice (*Oryza sativa* L.), wheat (*Triticum aestivum* L.), and maize (*Zea mays* L.). This pattern of reliance creates a concerning trend in our food system, posing challenges for both people and the planet. There are about 800 different species of underutilized edible crops in India, out of which about 300 species are used mostly by the tribal and rural population of the Northeastern region alone. Underutilized crops refer to wild or semi-domesticated plant species that are often overlooked and not fully utilized, despite their considerable potential. These plants have significant untapped benefits but have been largely neglected in agricultural and food systems. These crops are neither extensively cultivated on a commercial scale nor widely traded, primarily these are cultivated, trade and consumed on a local level. These crops belong to categories such as cereals and pseudocereals, legumes, vegetables, oilseeds, roots and tubers, aromatic and medicinal plants, fruits and nuts, and have earned collective names such as 'neglected and underutilized' or 'forgotten', 'orphan', 'minor' crops. Underutilized species include not just food plants but also many other species— wild or cultivated—used as sources of oil, fuel, fibre, fodder, beverages, stimulants, narcotics, ornamental, aromatic compounds, and medicine. These plants are significant not just for conservation but also for gaining insights into their genetic background and important genes or alleles that favour their survival in

harsh environments. They are instrumental in providing food, improving livelihoods, and nutritional coverage for people living in hilly areas. Underutilized crops have the potential to be crucial in resolving the world's ongoing food challenges. They offer sustainability, adaptability, and nutritional value that can contribute to food security, agrobiodiversity conservation, and a more resilient agricultural system and agro-food value chains. Many of these species are incredibly resilient, and their capacity to adapt to challenging growing and climatic conditions holds tremendous promise in the era of climate change. In this context, they are the crops of the future.

Therapeutic diversity of underutilized horticultural crops in NE Region of India

Several wild indigenous fruit crops which are rare in other parts of the world grow favourably and naturally in the foothills track of Eastern Himalayas due to suitable geo-climatic conditions. The horticultural crops in this region encompass a diverse range, including tropical and subtropical fruits, temperate fruits, vegetables, and flowers, comprising both indigenous and introduced varieties. These underutilized crops not only play a pivotal role in bolstering agricultural diversity but also contribute significantly to food security while preserving traditional knowledge. Embraced by indigenous communities, these crops serve dual purposes by not only providing nutritional benefits but also contributing to traditional medicine systems, effectively addressing various health issues such as digestive disorders, inflammation, and respiratory ailments etc. The vast array of underutilized horticultural crops in the Northeastern hills represents a treasure trove with enormous therapeutic potential for a variety of ailments, underscoring the importance of exploring and conserving these valuable species.

Table 1. Therapeutic diversity of underutilized horticultural crops in NE region of India







Common name	Scientific name	Family	Distribution	Plants parts used	Therapeutic utility	Image
Carambola	<i>Averrhoa carambola</i>	Oxalidaceae	All north eastern states	Fruit and leaves	Fruit juice is used to counteract fever, lower high blood sugar and high blood pressure, and antidiarrheal effects.	
Burmese grape	<i>Baccaurea ramiflora</i> Lour.	Phyllanthaceae	Tripura and Meghalaya	Fruit, bark, leaves	Fruits – to treat skin diseases, improves immunity, decreases severity of cold and flu.	

Table 1. Continued

Common name	Scientific name	Family	Distribution	Plants parts used	Therapeutic utility	Image
Khasi cherry	<i>Docynia indica</i>	Rosaceae	Khasi hill (Meghalaya) and Sikkim	Fruit	To treat common ailments. Prophylactic for combating enteric diseases.	
Spine gourd	<i>Momordica dioica</i>	Fabaceae	Meghalaya & Mizoram	Fruit and leaves	Treating diabetes, cancer, and neurodegenerative diseases.	
Tamarillo	<i>Cyphomandra betaccln</i> Cav.	Solanaceae	Nagaland, Mizoram and Meghalaya	Fruit	Maintains blood pressure, lowers cholesterol levels, helps weight loss and to treat cold, sore throat and headache.	
Roselle	<i>Hibiscus sabdariffa</i> L.	Malvaceae	Mizoram & Meghalaya	Leaves and fruit	To treat hypertension and microbial infection.	
Turkey berry	<i>Solanum torvum</i> Sw.	Solanaceae	All north eastern ststes	Fruit	To treat fever, wounds, tooth decay, reproductive problems and arterial hypertension and in cases of liver and spleen enlargement.	
Indian pennywort	<i>Centella asiatica</i> L.	Apiaceae	Tripura	Whole plant	Leprosy, kidney trouble, ulcers, body aches, asthma, gastric, catarrh, elephantis.	
Vegetable fern	<i>Diplazium esculentum</i> (Retz.) Sw.	Athyriaceae	Nagaland & Meghalaya	Leaves	To treat diabetes, smallpox, asthma, diarrhea, rheumatism and wounds.	

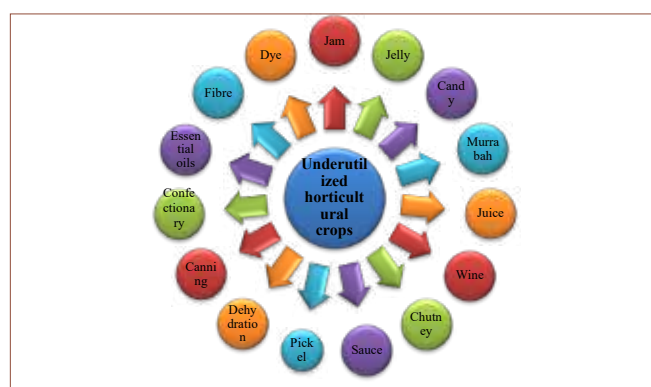
Table 1. Concluded

Common name	Scientific name	Family	Distribution	Plants parts used	Therapeutic utility	Image
Chameleon plant/ fish mint	<i>Houttuynia cordata</i> Thunb	Saururaceae	All north eastern states	Root, shoot and leaves	Treatment of cholera, dysentery, curing of blood deficiency and purification of blood.	
Sugandh-mantri	<i>Homalomena aromatica</i> (Spreng.) Schott	Araceae (Herb)	Tripura	Stem, leaves, root	To treat cold and cough, jaundice, stomach, and skin problems.	
Elephants foot yam	<i>Amorphophallus paeoniifolius</i>	Araceae	Tripura and Meghalaya	Stem, leaves, tuber	Tuber paste is applied externally to treat piles, toothache and rheumatism.	
Aerial yam	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	All north-eastern states	Tuber	To treat worms, piles and dysentery and to kill hair lice.	

Diversity of underutilized horticultural crops in terms of value-addition and post-harvest management

The untapped potential of indigenous and lesser-known horticultural crops in the region remains underutilized, despite their ability to address issues of poverty, food insecurity, and nutritional deficiencies through processing, value addition, and diverse applications. These fruits and vegetables boast high levels of vitamins and minerals, along with valuable secondary metabolites and medicinal properties that can be harnessed for industrial and medicinal purposes. Additionally, these underexplored crops exhibit resilience in adverse environmental conditions. Farmers in the Northeast are well-informed about these crops and their medicinal benefits, often using them to treat various ailments. Nevertheless, these crops are predominantly cultivated in backyard gardens or forested areas and are yet to be commercially grown. The various value-added products, such as jam, jelly, pickles, wine sauce, chutney, etc., and commercial products including essential oils, fibre, and dye, can be prepared from these underutilized horticultural crops. This provides an opportunity to boost income for local farmers and promotes sustainable agricultural practices.

Value-added products from underutilized horticultural crops



Source: Deka et al. 2012 and Barua et al. 2019

Table 2. Underutilized horticultural crops utilized for different value-added products

Underutilized crop	Products
Carambola	Pickle, juice, jam and jelly
Burmese grape	Jam and jelly
Khasi cherry	Fresh, juice, jam, jelly, wine
Tamarillo	Jam, pickle
Roselle	Jam from fruits, pickle from leaves
Elephants foot yam	Pickles, dried cubes, chips, thickening agents

Way forward : KVKs' perspective

- KVKs can play important role in exploring, identifying, characterizing, conserving, and safeguarding the germplasm of underutilized crops available in their agroclimatic region. It is imperative to initiate strategies for collaborating with research organizations for standardizing technologies for crop improvement, value-addition, processing, and the production of secondary metabolites.
- Underutilized horticultural crops are predominantly cultivated and managed within traditional farming systems by diverse ethnic communities. There is a heightened need to focus on documentation of indigenous knowledge associated with underutilized horticultural crops by thorough ethnobotanical studies. KVKs have a major role to facilitate in harnessing of improved value addition technologies to create the opportunities for secondary agriculture in NER by using a significant portion of native diversity for multipurpose uses.
- KVKs at the micro level may take the initiative for strategic intervention through 4P partnerships involving the public, private, producer and policy for creating incentive-based improved and

expanded cultivation of underutilized horticultural crops among farmers for providing multipurpose benefits to farmers.

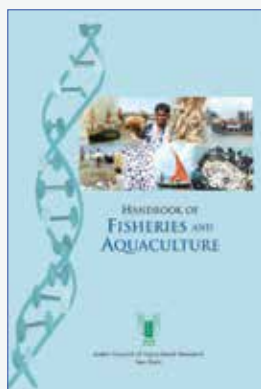
- To address the escalating demand for underutilized crops in the near future, it is imperative that KVKs play a significant role to raise awareness among urban populations regarding the nutritive values of these crops and the necessity to establish a lucrative market for them.

SUMMARY

The Northeastern region of India is a biodiversity hotspot, housing numerous underutilized horticultural crops with high nutritional and medicinal value. These crops, often neglected, have the potential to address food challenges, contribute to food security, and create a more resilient agricultural system. KVKs can play a vital role in conserving indigenous knowledge, collaborating with research organizations, promoting cultivation, and raising awareness about the nutritive value of these crops to benefit farmers and create a profitable market.

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TECHNICAL SPECIFICATIONS

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