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Research Article

Underutilized Vegetables, Importance and Its Utilization by the Tribal Community of Tripura, North-East India

Sajal Debbarma[1*], Jayanta Jamatia[2] and Thangjam Churachand Singh[3]

[1]Ph.D. Scholar, Department of Vegetable Science, G.B.P.U.A.T., Pantnagar, Uttarakhand, India

[2]Ph.D. Scholar, Division of Vegetable Science, Indian Agricultural Research Institute, New Delhi, India

[3]Ph.D. Scholar, Department of Agronomy, G.B.P.U.A.T., Pantnagar, Uttarakhand, India

*Corresponding Author E-mail: twiprasasajal@gmail.com

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ABSTRACT

Vegetables being a rich source of essential nutrients and antioxidants are the key component of the balanced human diet and also the main drivers in achieving global nutritional security by providing nutrients, vitamins, and minerals. The vegetable crops, which are neither grown commercially on large scale nor traded widely, may be termed as underutilized. Tripura is the second smallest state among the eight north-eastern states of India. There are 19 ethnic groups viz. Tripuri, Jamatia, Reang, Noatia, Chakma, Bhil, Bhutia, Chaimal, Garo, Halam, Khasia, Kuki, Lepcha, Lushai, Mog, Munda, Orang, Santhal and Uchoi residing in this state. Each group has its own unique language, culture, and food habit. Tripura has a diversity of underutilized vegetables embedded with rich nutrient potentials and medicinal properties along with the ability to stand against adverse climatic conditions. However, these underutilized vegetables are still neglected due to the lack of complete knowledge about their performance and input requirements, lack of planting materials, lack of information on how they can fit into production systems and non-viability of indigenous vegetable production like the major cultivated species of vegetables. In this context, it is necessary to take up programme on genetic resources exploration, management, utilization and improvement of these underutilized vegetable crops to ensure food and nutritional security for the future. This review article emphasizes the diversity of underutilized vegetables found in Tripura, their nutritional and medicinal value which could ensure food as well as nutritional security in India.

Keywords: *Underutilized vegetables, Tripura, North-East India.*

INTRODUCTION

The vegetable crops, which are neither grown commercially on large scale nor traded widely, may be termed as underutilized. Different names are used interchangeably to describe the range of underutilized vegetable crops. Some of these names are Orphan, abandoned, neglected, lost, underused, local, minor, traditional, forgotten, alternative, niche, promising and underdeveloped.

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Underutilized vegetables have local or regional importance and traditionally used for their fruit, fibre, fodder, oil or medicinal properties but generally, lack national recognition and appreciation. However, these species have an under-exploited potential to ensure food security, nutrition, health, income generation, and environmental services.

Tripura is a landlocked hilly state having a geographical area of 10,491 km^2. It is the second smallest state among the eight northeastern states of India. There are 19 ethnic groups viz. Tripuri, Jamatia, Reang, Noatia, Chakma, Bhil, Bhutia, Chaimal, Garo, Halam, Khasia, Kuki, Lepcha, Lushai, Mog, Munda, Orang, Santhal and Uchoi residing in this state. They speaks in their own language called *"Kokborok".* Each group has its own unique language, culture and food habit (Barman, 1983). It is rich with floristic diversity and falls under the biogeographic zone of North East B hills. The vast forest cover extends up to 57.73% of the state total geographical area (Anonymous, 2011). The flora comprises 379 tree, species, 320 shrubs, 581 herbs 165 climbers, 16 climbing, shrubs, 35 ferns and 45 epiphytes (Drury, 2006). Tripura being rich being rich in plant diversity, has a very large number of underutilized vegetable crops. Most of them are very rich sources of vitamins, minerals, and other nutrients such as carbohydrates, proteins, and fats. Since the underutilized horticultural crops have a long history of consumption, the local people are aware of their nutritional and medicinal properties. Moreover, these are cheap and readily available.

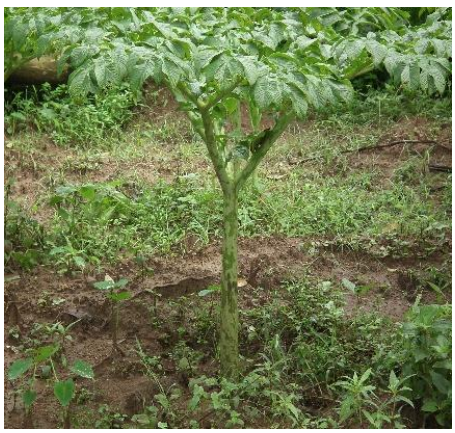
Importance of Underutilized vegetables

Underutilized vegetables constitute essential biological assets of the rural poor and can contribute to improving the well-being of millions of tribal population. Underutilized vegetables are rich in vitamins, minerals and other health-promoting factors including high antioxidant activity than other widely available commercial species and varieties. They play a major role in the diversification of diet leading to a more balanced source of micronutrients. Their enhanced use can bring about better nutrition. Focusing on underutilized vegetables is an effective way to help maintain a diverse and healthy diet and to combat micronutrient deficiencies, the so-called 'hidden hunger' and other dietary deficiencies particularly among the rural poor and the more vulnerable social groups in developing countries. Furthermore, underutilized vegetables possess high resistance to several biotic and abiotic stress and can successfully be used in a plant breeding programme. Underutilized vegetables play an important role in the life of rural people; they have potential to contribute to poverty elimination through employment opportunities and income generation and also through improved efficiency and profitability of farm household labour use in both rural and urban environments. With the use of underutilized vegetable crops, there is a way to reduce the risk of over-reliance on a very limited number of major crops. Besides, they can contribute to sustainable livelihoods through household food security as they can widen the food edibility options. They can also provide a broad spectrum of crops to improve productivity and global food security and to meet new market demands.

List of underutilized vegetables in Tripura

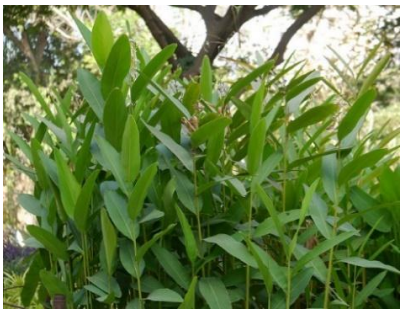
1. *Amorphophallus companulatus* (Elephant foot yam): It is a tropical tuber crop belongs to the family Araceae. It is a perennial, herbaceous plant found abundantly in the forest of Tripura. In local 'Kokborok' language it is called as 'Mui Morong'. The stem, Leaf, and Flower are used as vegetables. The corms are dug out after the crop is matured and processed as 'Batima' is also used in the preparation of local dish such as 'Mosodeng' (chutney). The corms are dry, acrid, pungent; increases both appetite and taste; digestive, anthelmintic and aphrodisiac; useful in vitiated conditions of vata and kapha, elephantiasis, inflammations, haemorrhoids, haemorrhages, abdominal pain, asthma, piles, dysentery, splenopathy, amenorrhoea, seminal weakness, fatigue, anaemia and general debility (Jain et al., 2009, Ramalingam et al., 2010). Besides, the corms are reported to

have antibacterial, antifungal and cytotoxic activities due to presence of a diterpenoid namely salviasperanol and amblyone, a **triterpenoids** (Anonymous, 1985, Khan et al., 2008)




Plant of Elephant foot yam and processed corm 'Batima'

2. *Alpinia allughas* (Retz.) (Bamboo-leaved Galanga): It is a stout perennial herb with tuberous, aromatic roots belonging to the ginger family. Morphologically it is characterized by the presence of rhizome, simple, wide-brim leaves protected by showy bracts and terminal inflorescences. It is called as 'Thorai' in Tripura. In Tripura mainly the tender part of the stem after removal of the bracts is used as vegetables and preferred by many due to its pleasant aroma. The rhizome is used as an aphrodisiac, tonic, diuretic, expectorant, appetizer, and analgesic. Besides, it also yields essential oil (0.05%) which contain caryophyllene oxide (23.07%), geraniol (19.93%), eudesmol (19.93%), citronellyl acetate (16.5%), citronellol (6.8%), b-caryophyllene (5.45%), a-pinene (3.84%), linalool (2.86%) (-) a-phellandrene (1.6%) and geranyl acetate (0.16%) (Rastogi & Mehrotra, 1991). Unani physicians consider it as a good remedy for impotence (Asolkar et al., 1992).




3. *Amaranthus spinosus* L. (Spiny Amaranthus): *Amaranthus spinosus*, commonly known as the spiny amaranth, spiny pigweed, prickly amaranth or thorny amaranth is a leafy vegetable of Amaranthaceae family, locally known as 'Kuskuriya Dalok' in Tripura. The plant is small, characterized by the presence of thorns all over the stems. However, the thornless type is also found. Leaves, stems, and flowers are cooked, steamed or fried and consumed as vegetable. Its leaves are excellent sources of protein, with its maximal accumulation in the blossoming phase (Kadoshnikov et al., 2005). Traditionally, the leaves and roots are used as laxative, diuretic, anti-diabetic, antipyretic,

anti-snake venom, antileprotic, anti-gonorrheal, expectorant, to relieve breathing in acute bronchitis (Alegbejo, 2013). It also has anti-inflammatory properties, immunomodulatory activity, anti-androgenic activity and anthelmintic properties (Olumayokun et al., 2004).


4. *Solanum torvum* (Wild brinjal): *Solanum torvum* is a bushy, erect and spiny perennial plant used horticulturally as a rootstock for eggplant. It is called as 'Khamka Shikam' in Kokborok. The plant is usually 2 or 3 m in height and 2 cm in basal diameter but may reach to 5 m in height and 8 cm in basal diameter. The shrub usually has a single stem at ground level, but it may branch on the lower stem. The immature fruits and flowers are used for making the delicious local dish called 'Gwdok'. The plant is sedative and diuretic and the leaves are used as haemostatic. A decoction of fruits is given for cough ailments and is considered to be useful in cases of liver and spleen enlargement (Kala, 2005). The fruits are rich in iron Manganese, calcium, copper, and zinc. The high iron content of the fruits proves the fact that the fruits truly have hematinic property (Akoto et al., 2015).

5. *Enhydra fluctuans* (Helencha)*:* It is a tropical herb, locally known as 'Alencha', belongs to the family Asteraceae and is gaining a lot of importance for its therapeutic potentials. This is an edible semi-aquatic herbaceous vegetable plant with serrated leaves. The stems and leaves are cooked as vegetable. The plant possesses nutritional value including- β-carotene, saponins, cholesterol, glucoside, enhydrin. The leaves are slightly bitter and reported to cure inflammation, skin diseases, laxative, bronchitis, nervous affection, leucoderma, biliousness and good in small pox (Ali et al., 2013). Besides, it also possesses Antioxidant, Hepatoprotective, CNS Depressant, Analgesic and Antidiarrheal activity (Uddin et al., 2005).


6. *Monochoria hastate* (L.) Solms : Monochoria is a semiaquatic herbaceous vegetable belongs to the family Pontederiaceae, found in different parts of Tripura. It is known as 'Chichiri' in Kokborok. Leaves are thick and soft with floating hastate blades, 12-20 cm long and 1.5-10 cm wide, sheathing at the base of petiole 10.5-17 cm long. The flowers are purple in colour It mostly grows in the rice field and considered as a weed in many countries. The whole plant is cooked as vegetable. *M. hastata* have a high content and good extractability of protein, coupled with low fibre content, compared with forage plants which are usually employed for LPC extraction (Morrison, 1961).

7. *Dioscorea polystachya* (*Chinese yam*) : Chinese yam is a climbing, twining and perennial monocots of yam family known as 'Tha Bolong' in Kokborok. Its vines typically grow 3–5 meters long, but can be longer. They twine clockwise. The leaves are up to 11 cm long and wide. They are lobed at the base and larger ones may have lobed edges. The tuberous roots are dug out carefully and consumed after steamed. It is starchy, can be used as a source of energy and can also be used possibly for medicinal purposes


8. ***Brassaiopsis palmipes*** **:** It is a plant species belongs to the family Araliaceae. Locally known as as 'chapok' in Tripura. The flowers are born in cluster. It has a high demand in the market of Tripura. The immature flowers are harvested and used for the preparation of local dish 'Gwdok'.

9. ***Canavalia gladiata*** **(Sword Bean):** *Canavalia gladiata* usually called as sword bean, is a plant species of the legume family. It is called as 'Baikang' in Kokborok. The plant is vigorous, deep-rooted and annual to perennial climbing. The stems, which are often slightly woody, can grow up to 10 metres long, scrambling over the ground or twining into other plants for support. The young seedpods are consumed raw or more commonly cooked and used as a vegetable. The seeds contain more crude protein, crude lipid and minerals like Na, K, Ca, Mg, P, Fe and Mn (Rajaram and Janardhanan, 1992). Sword bean has many ethnomedicinal properties and it is a source of urease, a useful compound for urea blood analysis in humans (Chopra et al., 2002).

10. ***Diplazium esculentum*** **:** *Diplazium esculentum*, the vegetable fern, is one of the top preferred edible ferns in the Himalayas and probably the most commonly consumed fern. It belongs to the family Athyriaceae. In Tripura, its local name is 'Mwikhonchok'. The plant is a perennial fern with ascending rhizome of about 15-20 cm and covered with short rufous scales of about 1-2 cm long. The frond can reach up to 1.5 cm height, and the pinnae are about 8 cm long and 2 cm wide. The tender fronds are blanched, boiled, or stir-fried. In Tripura, its demand is very high due to its high nutritive value. The edible fronds of

this fern are rich in iron, phosphorus, potassium and protein (Seal, 2012). It is also known for its β-carotene, folic acid, phytic acid, and tannins (Archana et al., 2012).

11. *Homalomena aromatic* (Sugandhmantri)

Homalomena aromatica Schott.) locally called as 'Gandrwi' belonging to the family Araceae is a rhizomatous aromatic perennial herb and found mainly in subtropical humid climates of Central America and Asia. In India, it is naturally localized in north eastern region and distributed in Assam, lower altitudes of Arunachal Pradesh, Nagaland, and Tripura. The plant is shade loving with short, stout and tough stem, slow growing with an average height to 0.40-0.80 m and heart-shaped dark green leaves with long petiole. In Tripura, the petioles are consumed as a vegetable. Its rhizome has several medicinal properties such as antidepressant, analgesic, antiseptic, anti-inflammatory, sedative, antispasmodic activities and treating joint pain. It also contains essential oil which has a high demand in perfumery and cosmetic industries. These medicinal and aromatic properties in the plant are due to the presence of certain phytochemicals and antioxidant property (Roy et al., 2018).

12. *Ocimum americanum* L.(American Basil): *Ocimum americanum*, known as American basil or 'Banta' in Kokborok is an annual herb with white or lavender flowers of Lamiaceae family. The plant is erect, hardy usually grow 20 – 30 cm tall. The young leafs along with tender twigs are extensively used as condiments by the tribal community of Tripura. It has a distinctive strong aroma and has much medicinal properties. The essential oil extracted from its leaves has anti-inflammatory activity (Yamada et al., 2013).

13. Oroxylum *indicum* (Sonapatha): *Oroxylum indicum* also known as Sonapatha or Shyonaka is a plant species belongs to the family Bignoniaceae. Locally known as 'Tokha Rwng' in Tripura. It is a tree which can attain a height of 12 meters (40 feet). In Tripura, the fruits which are 1 to 3 foot long, 2 to 4 inch broad are cooked as vegetable due to its medicinal properties. The fruits are acrid, sweet, stomachic, anthelmintic, effective in diseases of the throat and heart, piles, bronchitis, used as an expectorant, improves the appetite; useful in leukoderma (Deb, 1981, Nadkarni, 1982, Khane 2007) . In various tribes of India, bark and seeds of the plant are used in fever, pneumonia and respiratory troubles (Panghal et al., 2010). It is also used to cure various stomach disorders (Patil et al., 2008).

14. *Moringa oleifera* (Drumstick):

Moringa oleifera, known as drumstick is a versatile crop that can be grown as an annual or perennial vegetable. It belongs to the family Moringaceae. In Tripura, every part of drumstick is used as vegetable. However the tender pods are an excellent vegetable and most preferred. Tender leaves and pods have a high amount of Protein, Carbohydrates, Vitamin A, Vitamin C, and minerals. Besides it has many medicinal properties also. The leaves of the *Moringa oleifera* have been reported to demonstrate antioxidant activity due to its high amount of polyphenols (Sreelatha & Padma, 2009, Verma et al., 2009).

15. *Momordica dioca* (Spine Gourd): It is also known as kakrol or spine gourd belonging to the family Cucurbitaceae. It is known as 'Kangrong' in Kokborok. It has high nutritional and medicinal with economic values. The immature tender green fruits are cooked as vegetable. Young leaves, flowers and seeds are also edible. Fruits are also used in ulcers, piles, sores, and obstruction of liver and spleen. It also possesses several medicinal properties and is good for those suffering from cough and indigestion (Rai et al., 2005).

16. Parkia roxburghii (Tree Bean): It is one of the most common multipurpose tree species of Mimosaceae family in the northeastern region of India, especially in Manipur and Mizoram. Locally called 'Wakre' in Tripura. "Yongchak" in Manipur and Yontak" in Assam. Tree bean is a much-branched legume of medium height (10-12 m) with bipinnate leaves. The fruits in the early stages are soft, tender and bright green in colour. They turn blackish when fully mature in March-April. Pods are formed in clusters of 10-15, each measuring 25-40 cm in length and 2-4 cm in breadth (Kumar et al., 2002). The tender and matured beans have high demand in the market and are used in various dishes. The

beans, after scraping the out skin, are sliced into pieces for making traditional dish like 'Mosodeng' (Chutney) preparation. The tree is also of immense use in local medicines. A decoction of bark, fruit skin and leaf is being used to control diarrhea and dysentery.

17. Ipomea aquatica (water Spinach): *Ipomoea aquatica* is a semi-aquatic, fast-growing tropical plant grown as a vegetable for its tender shoots and leaves. It belongs to the family Convolvulaceae. It is found throughout the tropical and subtropical regions of the world. This plant is known as water spinach, river spinach, water morning glory, water convolvulus. It is known as 'Twi ni lot' in Kokborok. It flourishes naturally in waterways and requires little care. The greens are rich source of vitamins, minerals, proteins, fibres, carotene and flavonoids with many health benefits (Prasad et al., 2008). The leaves also have energy value (300.94±5.31 kcal/100 g) (Umar et al., 2007).

18. *Lasia spinosa* (L.): Lasia spinosa is an evergreen, herbaceous perennial plant of Araceae family growing 1 - 2 metres tall, spreading by means of a long, creeping, stoloniferous stem. Small prominent spines are found in the stem. In Tripura locally it is known as 'Pachok Kwlwi or 'Gantha'. Young leaves and petioles – are cooked and used as a vegetable. The leaves and roots are used as a remedy for piles. The plant possesses the major pharmacological activities including anti-helminthic, anti-bacterial, anti-inflammatory, and anti-oxidant, anti-diabetic, anti-hyperlipidemic, anti-tumor and various other disease preventive factors (Kankanamge & Amarathunga, 2017).

CONCLUSION

From the foregoing discussion, it can be concluded that Tripura has a vast diversity of underutilized vegetables embedded with rich nutrient potentials and medicinal properties along with the ability to stand against adverse climatic conditions. However, these underutilized vegetables are still neglected due to the lack of complete knowledge about their performance and input requirements, lack of planting materials, lack of information on how they can fit into production systems and non-viability of indigenous vegetable production like the major cultivated species of vegetables. In this context, it is necessary to take up programme on genetic resources exploration, management, utilization and improvement of these underutilized vegetable crops to ensure food and nutritional security for the future. Besides, underutilized vegetables production will also meet the shortage of per capita consumption availability thereby solving the nutritional deficiency and at the same time it will generate the employment, increase the income of rural people and finally it could contribute the national economy.

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