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Status, diversity and potential of indigenous and minor perennial vegetables

Indigenous and minor plants are those whose diversity is known to be in the country of their origin. So far 80 species of major and minor vegetable crops are reported to have originated in Indian sub continent. Among them, *Bambusa* spp., *Moringa oleifera, Murraya koenigi, Sauropus androgynus* and *Sesbania gradiflora* are some of the perennial plants whose plant parts are partly used for vegetable purpose. Many sections of rural population and ethnic communities meet their nutritional requirement through these indigenous vegetable crops and derive substantial income from their collection and trade. Several research studies also demonstrated that many of these indigenous and minor vegetable crops are vital sources of trace minerals and possessing therapeutic properties due to the presence of bioactive compounds. Considering their health benefits these less familiar vegetable crops are also gaining equal acceptability among the urban conglomeration.

INDIGENOUS and minor vegetables are best defined as the traditional crop species that are native to that particular region. They are important in view of nutrition, health and sustainability of the social systems in the region where they have been evolved over a period of time. Traditional vegetables play a major role in the diversification of diet leading to more balanced source of micronutrients. Unlike annual and biennial vegetable crops, which has major share in Indian vegetable production, perennials such as drumstick, ivy gourd, pointed gourd, spine gourd, sweet gourd, bread fruit, chow-chow, chekurmanis, etc. are grown and consumed in relatively small scale. These perennial vegetables have a handful of vital nutrients, trace minerals, antioxidants and medicinally important bioactive compounds. Lack of knowledge in consumers and farmers tendency to grow annual vegetables renders these vegetables of minor important in the human diet. Further, exotic perennial vegetables such as asparagus, rhubarb, artichokes, etc. are not part of the average Indian human diet even today. Indigenous vegetables shows substantiate biodiversity and are adapted to specific marginal growing conditions with minimal inputs. Diversifying the existing production systems with traditional vegetables will increase the heterogeneity and subsequently lead to better resilience to abiotic and biotic stresses.

Potential role of indigenous perennial vegetable crops

Ecosystem stability

Climate extremities and the increased degradation of land and water resources have led to a growing interest in crops that are adapted to difficult environments. Being a native to the habitats, indigenous perennial vegetables can be grown under adverse soil and climatic conditions. Drumstick is well adaptable to dry and hot climates of the north-western plains, central India and dry regions of peninsular India and is considered as drought resistant. Farming with perennials provides an important way of mitigating climate change by means of aerial carbon sequestration.

Bamboo spp.

Basella rubra

Carissa

Crambe cordifolia

Gmelina arborea

Parkia roxburghii

Income diversification for rural poor

With increased awareness about healthy diet, the demand for novel food products is gaining momentum especially from the markets in developing countries. These market opportunities can generate additional income for poor farmers in less-favoured environments where these crops have comparative advantages over the commercial crops. Perennial vegetable cultivation demands less expenditure and gives high returns. Consumption of perennial vegetables makes the availability of nutrients and vitamins at cheaper cost, thereby helps in solving malnutrition in rural areas. Growing of perennials with multiple uses food, fodder and fuel will diversify the income source.

Combating malnutrition

Many indigenous and minor vegetables are nutritionally rich. Utilization of these species, either wild or cultivated, can have significant impact on the nutritional security and well-being of the poor. Their enhanced use can bring about better nutrition. For instance, Chekurmanis is known as multivitamin green as

Table 1. List of indigenous and minor perennial vegetables in which leaves are used as vegetable

Scientific name	Local name/s	Family	Growth habit	Ethno botanical use
Bacopa monnieri	Indian brahmi	Plantaginaceae	Creeping herb	It is bitter, pungent, heating, emetic, laxative and useful in bad ulcers, tumours, enlargement of spleen, indigestion, inflammations, leprosy, anaemia, biliousness, etc. It is a promising blood purifier and useful in diarrhoea, fever, epilepsy.
Bambusa spp.	Bamboo	Poaceae	Perennial herb	Edible shoots are low in fat and calories, good source of fibre, and have several medicinal properties including anticancer, antibacterial, antifungal and antiviral activity.
Basella spp.	Indian spinach	Basellaceae	Perennial vine	The tender shoots, leaves, leaf stalk and stem are used as vegetable, soups or stew. *B. alba* is used as cooling medicine in digestive disorders and contains antiviral substances.
Clerodendrum colebrookianum	East Indian glory	Lamiaceae	Perennial shrub	Boiled decoction is taken to get relief from high blood pressure and for rheumatic pains. Roots with bark are used in treating bronchitis and asthma.
Diplazium esculentum	Vegetable fern	Athyriaceae	Perennial fern	It is rich in micronutrients, especially iron, manganese and zinc, and is used in curry in various forms, or prepared as vegetable and pickle.
Gmelina arborea	Malay bush beech	Lamiaceae	Deciduous tree	The root and bark are stomachic, galactagogue, laxative, and anthelmintic. They improve appetite and are useful in hallucination, piles, abdominal pains, burning sensations, fevers, 'tridosha' and urinary discharge.
Nymphaea spp.	Water lily	Nymphaeacea	Perennial shrub	The rhizomes are cooling, sweet, bitter and tonic, and useful in treating diarrhoea, dysentery, dipsia and general debility.
Paederia foetida	Stinkvine	Rubiaceae	Perennial vine	Useful in treating bowel troubles, rheumatism, urinary retention, urinary bladder stones, fevers and flatulence.
Pandanus amaryllifolius	Indian pandan	Pandanaeae	Perennial shrub	leaves of the Indian pandan are used as a flavouring agent in cooking especially rice dishes cakes and sweet beverages.
Pisonia grandis	Lettuce tree	Nyctaginaceae	Perennial shrub	Leaves are used as diuretic and also for treating diabetics.
Polygonum spp.	Knotweed	Polygonaceae	Perennial shrub	Leaves are crushed with ginger and eaten.
Urtica spp.	Nettles	Urticaceae	Perennial herb	It is used in anti-itch drugs and in cremes containing antihistaminics or hydrocortisone.
Zanthoxylum hamiltonianum	Tejamoo	Rutacea	Prickly shrub	The dried and powdered fruits are consumed to increase appetite. The tender stem is used to brush teeth when there is toothache.

Table 2. List of indigenous and minor perennial vegetables in which fruits and leaves are used as vegetable

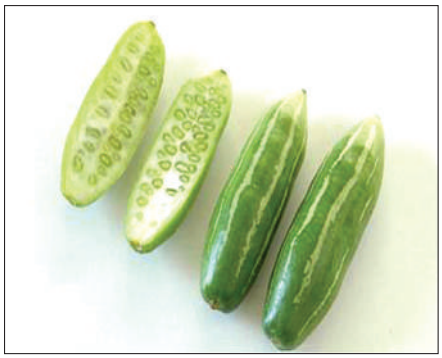
Scientific name	Crop	Family	Growth habit	Ethno botanical use
Coccinia grandis	Ivy gourd	Cucurbitaceae	Perennial vine	Fruits are nutritious - the young and tender green fruits are used raw in salads and curry or cooked as vegetables. The juice of the roots and leaves is used in treating diabetes and gonorrhoea. The leaves are used as a poultice in treating skin eruptions.
Moringa oleifera	Drum stick	Moringaceae	Deciduous tree	Drumstick tree or horse radish tree is rich in vitamins A and C, mineral-packed (calcium, phosphorus and iron), and highly nutritious perennial vegetable.
Parkia roxburghii	Tree bean	Fabaceae	Deciduous tree	Mature flowers and young shoots are used as curry and in salads. Tender pods are rich sources of fibre, protein, vitamin C, phosphorus and iron.
Piper mullesua	Hill pepper	Piperaceae	Perennial vine	The dried plant is consumed to cure malaria and cough diseases. Roots and fruits are used in Ayurvedic medicines.
Sesbania grandiflora	Agathi	Fabaceae	Small tree	It is aperient, diuretic, emetic, emmenagogue, febrifuge, laxative and tonic, and is a folk remedy for bruises, cataract, dysentery, eyes, fevers, headaches, smallpox, sores, sore throat, stomatitis and night blindness.
Solanum indicum	Bush tomato	Solanaceae	Perennial shrub	Fruits are digestive but more quantity is considered toxic due to the presence of solasodine. Fruits are eaten to cure dysentery, gastritis, malaria and indigestion due to high alcohol consumption.
S. spirale	Titakuchi	Solanaceae	Perennial shrub	Green fruits are eaten, especially during malaria outburst. The dried ripe fruits are used (sole or mixed) for stomach pain and gastric problem.
Trichosanthes dioica	Pointed gourd	Cucurbitaceae	Perennial vine	Pointed gourd has been used for overcoming problems like constipation, fever, skin infection and wounds. It also improves appetite and digestion.

Table 3. List of indigenous and minor perennial vegetables in which fruits are used as vegetable

Scientific name	Local name/s	Family	Growth habit	Ethno botanical use
Artocarpus altilis	Bread fruit	Moraceae	Perennial tree	Fruits of the bread fruit are rich in carbohydrates and are used mostly as vegetable for culinary purposes.
Capparis deciduas	Ker	Capparaceae	Bushy shrub	Fruits are used to cure many ailments in traditional medicines. Seeds contain 20% oil, 1.7% sugar and 8.6% protein.
Carissa carandas	Karonda	Apoynaceae	Perennial shrub	Fruits are antiscorbutic and useful in curing anaemia. Ripe fruit is sweet and cooling, and used as appetiser. It is useful in treating anorexia, vitiated conditions of pitta and vata, burning sensation, skin diseases, and scabies.
Cordia myxa	Lasora	Boraginaceae	Deciduous tree	The fruits are useful in vitiated gastric problems, ulcer, leprosy skin diseases, dry cough, bronchitis, burning sensation, chronic fever, arthritis and skin disorders.
Dillenia indica	Elephant apple	Dilleneacea	Perennial shrub	Fruits are juicy and acidic, eaten raw and also used in making jelly, cooling drink and vegetable curry.
Litsea cubeba	Mountain pepper	Lauraceae	Evergreen tree	Seeds are chewed in case of threadworm infection. Oil from unripe fruits (61.8%), flowers and leaves are rich in citral which is used in perfume and medicine. It possesses antimicrobial property apart from its effectiveness in coronary heart diseases.
Prosopis cineraria	Khejri	Fabaceae	Deciduous tree	Pods are astringent and rich in crude protein, carbohydrates and minerals. They are also used as famine food. The bark is cooling, anthelmintic and used as tonic for curing leprosy, dysentery, bronchitis, asthma, leucoderma, piles, tremors of the muscles, rheumatism, cough, cold and asthma.
Sechium edule	Chayote	Cucurbitaceae	Perennial vine	Chayote or *choko* fruits are rich in amino acids and are used as vegetable and snack. Infusions of the leaves are used to dissolve kidney stones and to treat arteriosclerosis and hypertension; infusions of the fruit are used to alleviate urine retention.

Polygonum spp.

Sechium edule



Tricosanthes dioica

it holds a good number of vitamins in appreciably higher quantities in its leaves. Basella (12276 IU/100 g), drumstick leaves (11187 IU/100 g) and chekurmanis (9510 IU/100 g) contain high levels of vitamin A than other annual vegetables such as amaranthus (9108 IU/100 g), spinach (8100 IU/100 g), and carrot (1000 IU /100 g). Many indigenous vegetables contain more vitamin C and pro-vitamin A than widely available commercial crops. Focusing attention on indigenous vegetables is an effective way to combat micronutrient deficiencies, the so-called 'hidden hunger', particularly among the rural poor.

Diversity in indigenous perennial vegetables

Indigenous and minor vegetables are regionally important. Due to their limited use and limited areas of cultivation not much selection pressure has operated on them and thus they are likely to carry some useful traits like adaptability to adverse environmental conditions and tolerance/resistance to diseases. Some of these less-known vegetables occur as semi-wild/protected/ gathered from wild and show trends of domestication. Protein rich pods of *Parkia roxburghii* consumed as staple legume vegetable in the north eastern region of India. Despite being recognized for their nutritional value, the possible reasons of low utilization of this crop species is lack of supply and non-viable indigenous market when compared to major vegetables. In drumstick (*Moringa oleifera*) considerable research work is going on in India and cultivars have been developed. Over 257 accessions mainly of cultivated *M. oleifera* were collected from different phyto-geographical regions of the country. Wild/ semi-domesticated leafy vegetables are extensively used by the tribals of north eastern region and have been short-listed (336) for collection by ICAR-NBPGR. Information on tribal vegetables such as *bohar bhaji* (*Hymenodictyon excelsum*) consumed for succulent leaves (a trees usually grown around tribal homes in Chhattisgarh used for preparing delicious vegetable) was gathered during plant exploration. Semi-protected populations of *Cassia tora* (often collected from the wild) was reported under cultivation by tribals of Khammam district of Telangana and Bastar and Dantewada districts of Chhattisgarh. Meetha patta (*Plukenetia corniculata*) was noted under cultivation at field as well as homestead level for use as a leafy vegetable by the Naga tribes in Dimapur and Mokokchung districts of Nagaland. A total number of 307 accessions in *Coccinia grandis*, 40 accessions in *Sechium edule*, 158 accessions in *Tricosanthes dioica*, 24 accessions in *Murraya koenigi*, 94 accessions in *Basella alba* have been collected and conserved at ICAR-NBPR, New Delhi.

Indigenous and minor perennial vegetables

The list of promising indigenous and minor perennial vegetables are categorized based on the plant parts used as vegetable such as plants in which only leaves are used as vegetable; plants in which both leaves and fruits are used and plants in which only fruits are used as traditional vegetable (Tables 1,2,3). Details are also mentioned regarding their traditional and ethno botanical usage in the native regions.

SUMMARY

Despite possessing an immense value as a nutritious food source, many indigenous and minor perennial vegetable crops remain widely unknown. Still cultivation and their consumption are restricted to few sections of the society. Given the rapid decline on traditional knowledge on these crops, it is pertinent to document the existing diversity, assorted usage and information on cultivation practices. It is also true that many more indigenous and minor vegetable crops believed to be edible are yet to be documented and bring them into the scientific domain. These vegetables grow well in low input farming systems which is gaining popularity in the recent time. They have a definite role in alleviating hunger and micronutrient deficiencies. The rich diversity can also be explored to identify the genes conferring abiotic and biotic resistance for future breeding programmes. Modern scientific studies validated the therapeutic applications of the biologically active compounds identified in these crops. These applications created a greater scope for exploring the pharmaceuticals. Developing an inventory of indigenous and minor perennial vegetable crops, information on ethno botanical properties, evaluation of nutritional benefits can establish these vegetable crops as an alternative to achieve nutritional security and livelihood sustenance.

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