

Indigenous and minor vegetables of Western Ghats

Western ghats are one among the four mega-biodiversity hotspots of India, out of 36 designated hotspots across the globe. UNESCO has declared Western ghats region as a heritage site with high significance to human civilization. Western Ghats are a chain of low to high hills lying parallel to the Arabian Sea with unique agro-ecological habitats, predominantly high rainfall and high humid conditions followed by a mild winter and an extended summer. Prevalence of endemic species is also very high in Western Ghats. The leeward side receives less rainfall and certain pockets are rain shadow areas. The high ranges, midlands and the West coast offer several unique micro climates and specific niches for the evolution, and cultivation of speciality vegetables. Irrigation availability, extended monsoon, no or mild winter and cool climate in the hills, altitudinal and topographic variations, all permit year round cultivation and availability of one or more vegetables. While tuber crops and tree vegetables are seasonal, cultivation of annuals can be taken up more than one crop in a year. Ratoon crops like ivy-gourd, drumstick and vegetable banana are a component of all homestead farms along West Coast. Commercial vegetable plots are few and high density multi-species tree based cropping system is more prevalent in Western Ghats and West Coast. The less known, less cultivated, ethnically important and wild gathered indigenous vegetables of Western ghats are highlighted in this paper.

SPECIES diversity of plants used for vegetable is enormous in this part of the country as immature or unripe fruits of many fruit trees, wild gathered vegetables, less cultivated vegetables, naturalised exotics from iso climatic regions and tropical tuber crops all offer an array of diverse vegetables. Immature fruits of pineapple, sweetsop, mango, jackfruit, banana, papaya etc. are consumed as vegetables. Many wild relatives especially that of crops belonging to genera *Momordica*, *Solanum*, *Abelmoschus* (*A. moschatus*), *Colocasia* etc. are also consumed as health foods. There are several ritualised traditions and ITKs associated with indigenous vegetables in Western ghats.

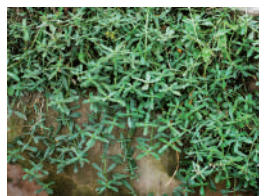
The diversity of recipes and diets depend on the availability of raw materials and ingenuity of chef, both are abundantly present in the region. Drumstick leaves are not consumed in peak monsoon months (*Karkidagam* (July-August) month in Malayalam calendar) as with heavy rain it is believed to accumulate anti-nutrition principles. Also health traditions of using certain curative vegetables for the treatment of piles (*Momordica dioica*), anaemia and those under convalescence (Drumstick leaves) are prevalent in the region. The famous '*pathilakkari*' (ten leaf vegetables) comprising wild *Colocasia*, *Cassia tora*, *Trianthema*, pumpkin, cowpea, *Amaranthus*, elephant foot yam, taro, ivy-gourd and *Tragia involucrata* is consumed

during peak rainy season as health food. '*Thampuli*', a spicy rasam made of leaves of *Coleus aromaticus* is consumed in coastal Karnataka as a prophylactic health food during monsoon season to protect the body from fever. The ritualistic '*Thiruvathira puzhuku*' offering with tropical tuber crops like yams, taro, Chinese potato etc. with horse gram is also a must-to-eat vegetable combination for women devotees during fasting period. The '*Vallasadya*' of Aranmula Sri Parthasarathy temple offers over 101 vegetable dishes using traditional vegetables. Oriental pickling melon is an unavoidable item in the '*Vishukani*' ritual of Kerala homes and temples. The vegetables of Western ghats region are unique for its species diversity, parts used, genetic diversity with specific landraces for specific uses, shelf life, adaptability to organic cultivation, suitability for low input homestead farming and medicinal properties. Vegetables like drumstick, *Boerhaavia*, species of *Solanum* and *Momordica*, *Alternanthera*, *Centella*, *Aerva* etc. are well known Ayurvedic medicinal plants.

Only some crops like bitter gourd, brinjal, ash gourd, snake gourd, oriental pickling melon, leafy amaranth and tropical tubers like taro, elephant foot yam, greater yam, lesser yam and Chinese potato are cultivated for commercial market. The indigenous vegetables of Western ghats fall under different categories such as commonly cultivated, less cultivated, wild gathered,



Aerva lanata



Alternanthera sessilis



Amaranthus tricolor



Amaranthus tricolor



Bird's eye chilli



Bittergourd-
Rudrakshali



Bread fruit



Centella asiatica



Colocasia gigantea



Curcuma amada



Oriental pickling
melon - Mikkikai



Momordica charantia
var. *muricata*



Momordica dioca



Momordica tuberosa



Moringa concanensis



Mucuna utilis



Murraya koenigii



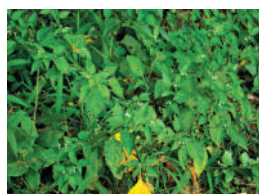
Oriental pickling
melon



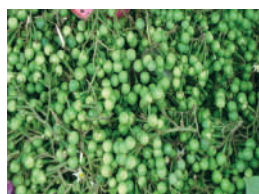
Sauropus androgynus



Sesbania grandiflora



Solanum nigrum



Solanum torvum



Solena amplexicaulis



Talinum triangulare



Canavalia gladiata

multipurpose (cultivated as fruit/pulse but also used as vegetable at early stage of maturity or some other parts like banana pseudostem, banana male inflorescence and *Colocasia* petiole, elephant foot yam leaves, drumstick leaves and flowers, ivy gourd clipping etc.), condiment-taste builders and pickling vegetables. A brief description of native vegetables including naturalised exotics of Western ghats under the category of tree vegetables, commercial vegetables, wild gathered vegetables and those cultivated only for own use are given below.

Tree vegetables

Drumstick (Moringa oleifera)

It is one of the most important tree vegetables in South Indian home gardens. Though tender pods are commercially important vegetable, leaves and flowers are also esteemed as vegetable. Even though propagated through woody stem cuttings, genetic diversity is high due to chance superior seedlings and farmer selections.

Medicinal purpose '*Marunnu muringa*', exclusively leafy vegetable purpose '*Elamuringa*', extra long fruited 'Jaffna' are some of the rare landraces prevalent in Kerala. A few released varieties like PKM 1, Anupama, and AD 2 are also available for large-scale cultivation. Drumstick is esteemed for its high nutritional value, appealing flavour and is an unavoidable component in traditional recipes like '*Sambar*' and '*Aviyal*'. It is a native of North West India and lower Himalayas but domesticated in South of Vindhyas. It is a good source of medicinal honey. In Deccan Plateau and drier tracts of Western Ghats improved varieties are cultivated in a commercial scale. Value-added products like leaf powder and food supplements from leaf are available.

Agathi/Vegetable Humming Bird (*Sesbania grandiflora*)

It is a small legume tree vegetable grown occasionally for its leaves and flowers used as vegetable. White flowered types are preferred for vegetable and red flowered

ones are more of medicinal value. Even though highly nutritious, it is bitter, the taste can be improved by pre cooking and draining the water and mixing with dal or other vegetables. Agathi is of South East Asian origin adapted to medium to high rainfall and sub humid to humid climates. Propagation is through seeds and leaf harvesting can be taken once in a month from 6th month onwards.

Hog Plum (Spondias pinnata)

Hog plum also called as *Ampatt* and *Ambazhanga* in Malayalam, it is a native tree of India. Used as black pepper support, its tender fruits are used for pickle. Ripe fruit is sweet and sour and is also edible. Fruiting is seasonal with tender fruits available in June-August. Propagation is through mature stem cuttings.

Cultivated commercial/home garden vegetables

Yard long bean (Vigna unguiculata subsp. sesquipedalis)

Yard long bean is one of the most popular and preferred vegetables of Kerala. It is grown throughout the tropics, but very common in South eastern Asia and Southern China. It is an annual climbing plant, used as a green vegetable. The pods can be eaten fresh or cooked in a variety of dishes. Young, immature pods are one of the very low-calorie vegetables; 100 g beans contain just 47 calories but rich in protein (4.0 g/100 g). Several improved varieties like Arka Mangala, Githika, Manjari, Jyothika, Lola, Kairali, Vijayanthi are available for large scale cultivation. Dwarf bush types are also available.

Oriental pickling melon (Cucumis melo var. conomon)

It is an annual prostrate to low trailing herb cultivated along West coast for its unripe fruits, used in several ethnic recipes and also in common vegetable preparations like *sambar* and *aviyal*. Its golden coloured fruits with green stripes are an integral part of ritualistic *Kani* offering associated with Vishu festival in Kerala. Good diversity is available in West coast. *Ponavellari*, *Kallanvellari*, *Kanivellari*, *Mikkikai* are some of the unique landraces all with high shelf life. Propagation is through seeds and best season is summer as an irrigated crop.

Leafy Amaranth (Amaranthus spp.)

'Rajgheera' (*A. blitum* var. *oleraceus*) and *arakeerai* (*A. tricolor* var. *tristis*) are ethnic landraces of leafy amaranth. Very high morphological diversity in Chinese spinach (*A. tricolor*) is available across Western ghats. Multi-cut types, late bolting types, ornamental stem and leaf types have been collected and conserved. Spleen amaranth (*A. dubius*) is also commonly cultivated in West coast and *A. graecizans* is restricted to Nilgiris. The wild and weedy species, Viz. *A. viridis* and *A. spinosus* are also consumed as leafy vegetables.

Chekkurmanis (Sauropus androgynus)

Chekkurmanis is a perennial small shrubby leafy vegetable ideal as hedge. Regular pruning gives plenty of new clippings. The plant is a native of Indo-Burma region with maximum cultivation in South-East Asian countries and Kerala, Coastal Karnataka and North Eastern states

of India. Propagation is through semi-hard wood cuttings. Leaves are rich in proteins, minerals and vitamins and aptly called multivitamin *madhura keera*. Tender leaves are of acceptable taste, non bitter, available year round and do not need any pre-cooking.

Malabar Spinach (Basella alba)

Basella (*Pasalakeerai* in Tamil) is of South East Asian origin and cultivated across the country, often in coastal Karnataka home gardens for its tender leaves and clippings used as leafy vegetable. The red form (*Basella rubra*) is also used to a small extent even though the green form is more preferred. Propagation is through fresh ripe seeds and vine cuttings. The crop needs pandal to support for optimum herbage yield. Root knot nematode infestation is a major problem affecting large scale cultivation. It prefers well drained fertile soils and sunny sites for good yield.

Roselle (Hibiscus sabdariffa)

Called as *Mathipuli* in Malayalam and *Pulichakeerai* in Tamil, it is used in preparing fish curries and making chutney, pickle etc. It is an annual herb cultivated occasionally throughout India for its tender leaves and fleshy calyx, both used as an ingredient of dal preparations. Young seedlings and clippings are used extensively in Andhra Pradesh and Telangana as main ingredient in *Gongura* pickle. Propagation is through seeds.

Wild gathered vegetables

Spine gourd (Momordica dioica)

Known as *Erumapaval* (Malayalam), *Aakakara* (Telugu), *Palupakkai*, *Palapalakkai* (Tamil), it is a dioecious, ratooning tender fruit vegetable related to bitter gourd, but without any bitterness. Leaves are also cooked as greens. Occurring wild in West coast and lower Western ghats, it is a wild-gathered high-value vegetable with high nutritional and medicinal value. Propagation is through tubers, seeds or rooted vine cuttings. It needs staking or '*pandal*' for good crop and prefers partially shaded forest-like habitats.

Mountain spinegourd (Momordica sahyadrica)

Known as *Madagalikka* (Kannada), *Pothupaval* (Malayalam), it is closely related to spine gourd. It is also a wild-gathered, high-value vegetable of Western ghats (hills). Leaves are also used as vegetable. Propagation is through tubers, seeds or rooted vine cuttings. Cultural practices are similar to that of spine gourd. It can be profitably cultivated as a ratoon crop in home garden.

Athalakkai (Luffa tuberosa)

It is a weak-stemmed low herb with perennating tubers, found wild in Deccan Plateau and rain shadow areas and leeward side of Western ghats. Tender fruits are esteemed as a vegetable with medicinal properties especially as health food for diabetics. Propagation is through seeds and tubers.

Kattupaval/Methipaval (Momordica charantia var. muricata)

It is a wild gathered or semi-domesticated small bitter gourd. Fruits are small (20-30 g) and esteemed as medicinal health vegetable. Propagation is through seeds

and cultivation is similar to that of bitter gourd.

Karuvachakka (Solena amplexicaulis)

It is a wild-gathered vegetable of drier tracts of Western ghats. Tender fruits are eaten as salad and are crisp and tasty. Propagation is through seeds and it perennates through underground tubers enabling ratooning.

Foetid Cassia or Thakara (Senna tora syn: Cassia tora)

It is an annual weedy legume, the tender leaves and clippings from seedlings are cooked as vegetable which taste somewhat similar to methi. Consumed across West coast, it is often a wild-gathered vegetable of monsoon season and rarely cultivated.

Ponnankanni (Alternanthera sessilis)

Alternanthera is a genus of perennial low herbs used as leafy greens. *Alternanthera sessilis* is a wild gathered vegetable of moist places esteemed for its delicious taste. *Alternanthera denticulata* and *Alternanthera nodiflora* are also cultivated. The latter two need trimming to encourage new sprouts. Propagation is through stem cuttings.

Common purslane or Parippukeerai (Portulaca oleracea)

It is a succulent prostrate annual, often a weed of cultivated fields; it is consumed as leafy vegetable in peninsular India. The cooked vegetable is mucilaginous and slightly sour in taste, but said to be rich in omega 3 fatty acids.

Indian pennywort (Centella asiatica)

Called *Kudangal* in Malayalam and *Vallarai* in Tamil, it is a prostrate aromatic herb with semicircular leaves on erect leaf stalks. It prefers moist wet places and

propagation is through offsets. Young leaves are used in the preparation of chutneys and is brain tonic and therapeutic food for mouth ulcer.

Purarnava or Thazhuthama (Boerhavia diffusa)

It is a procumbent herb occurring as a weed of open places. Esteemed for its medicinal properties, the whole plant and roots are extensively used in Ayurveda. Tender leaves are cooked as spinach and have an agreeable taste. Propagation is through seeds, stem cuttings or rootstock.

Burmese coriander (Eryngium foetidum)

It is a low herb propagated by seeds and suckers. The aromatic leaves are used as a condiment in chutneys, rasam and also to flavour curries as a substitute to coriander leaves.

Orah/Hullisoppu (Rumex vesicarius)

It is a kitchen garden vegetable cultivated occasionally in coastal Karnataka districts. It is an annual herb propagated through seeds. Tender leaves are harvested periodically and cooked along with dal or used in chutneys. Taste is sour.

Clove bean (Ipomoea muricata)

It is an annual weak stemmed herb, native to *Terai* belt and Himalayan foothills of Nepal, but domesticated in Kerala and Karnataka as a vegetable. Tender fruits along with fleshy fruit stalk are cooked as vegetable. Propagation is through seeds. It needs staking or *pandal* and open areas for a good crop.

Other less cultivated or wild gathered vegetables and alternate use of other crops of Western ghats are given in Table 2 and 3.

Table 1. Landrace diversity and improved varieties of Indigenous and minor vegetables in the Western ghats

Cultivar name	Botanical name	Landraces	Improved varieties
Brinjal	<i>Solanum melongena</i>	Vengeri vazhuthina, Manjarikkode Baigan, Uduppigulla, Agazim, Rampur badane	Surya, Haritha, Arka Neelkant
Amaranth	<i>Amaranthus</i> spp.	Keerarashi, Thuvanamkeera, Kuppai cheera, Chuvanna cheera, Thandukeera, Rajgheera, Arakkerai	Arun, Arka Suguna, Arka Arunima, Arka Samraksha, Krishna
Elephant foot yam	<i>Amorphophallus paeoniifolius</i> var. <i>campanulatus</i>	Neychena	Gajendra, Sree Padma
Ash gourd	<i>Benincasa hispida</i>	Neykumbalam, Vallikumbalam, Vaidya kumbalam, Thadiyankai, Elavan	Indu, KAU local
Taro	<i>Colocasia esculenta</i>	Korikala, Kuttanchembu, Thondi, Kuzhinirayan, Thamarakkannan, Kottachembu, Podichembu, Kulachembu, Vettuchembu, Kodavazha chembu, Kannan, Chemban, Karuthakannan, Velutha kannan, Velumthal, Pindalan, Madi, Karimchembu, Kudamalaran	Sree Rashmi, Sree Pallavi
Oriental picking Melon	<i>Cucumis melo</i> var. <i>conomon</i>	Wyanadan Vellari, Thimbalakkai, Mikkikai Ponavellari, Kallan vellari, Kani vellari	Aruna, Soubhaghya, Mudicode local
Cucumber	<i>Cucumis sativus</i>	Thonthakkai, Doppasouthe, Mulsouthe, Belisouthe	Himangi, Heera, Subra, KPCH-1
Snake gourd	<i>Trichosanthes anguina</i>	Kaduthuruthy local	Manushree, Kaumudi, Baby
Bitter gourd	<i>Momordica charantia</i>	Rudrakshagali, Karandakapaval, Kuttathipaval, Vellapaval	VK 1, Priya, Preethi, Priyanka

Cultivar name	Botanical name	Landraces	Improved varieties
Greater yam	<i>Dioscorea alata</i>	Elanthoor vella, Pathala kachil, Kizhakka, Pulinthodan, Vellakachil, Unda kachil, Maveran, Elivalan, Kandikizhangu, Kaduvakkayan, Erachilkkachil, Poozhu kachil, Bharanikachil, Parassikkodan	Indu, Sree Swathy, Sree Keerthy, Sree Karthika, Sree Roopa, Sree, Shilpa
Lesser yam	<i>Dioscorea esculenta</i>	Mukkizhangu, Nanakizhangu, Mullankizhangu	Sree Latha, Sree Kala
Lablab bean	<i>Lablab purpureus</i>	Mochai, Vellamocha, Kolikkalvara, Pacchavara, Karavari, Palavara, Puttuavara, Nattavara, Chigattiavara, Vellamochai	Arka Adarsh, A. Krishna, A. Pradhan, A. Visthar, A. Bhavani, A. Prasidhi, A. Swagath, A. Amogh, A. Sambhram, A. Soumya. A. Jaya
Ridge gourd	<i>Luffa acutangula</i>	Pottikka, Erakkai, Thupputhuheerakkai	Arka Vikram, Arka Prasan
Yard long bean	<i>Vigna unguiculata</i> subsp. <i>sesquipedalis</i>	Kuruthola payar, Neelappayar, Kuttipayar, Vellapayar, Chuvappukuruthola, Vithapayar, Padapayar, Valli payar, Pathinettu maniyar, Thattappayar, Chuvannachatta, Kokkiri thenagani, Kanjikuzhipayar, Pullipayar, Karimanippayar	Arka Mangala, A. Samrudhi, A. Suman, A. Garima, Kanakamani, Githika, Lola, Bhagyalakshmi, Kairali, Anaswara, Vellayani-Jyothika, Kashi Komal, Manjari

Table 2. Less cultivated/wild gathered and alternate use of other Indigenous and minor vegetables of Western Ghats

Species	Remarks
<i>Ceropegia bulbosa</i>	Edible leaves and tubers
<i>Decalepis hamiltonii</i>	More popular in Karnataka; leaves used in pickle and to make sherbat
<i>Remusatia vivipara</i>	Leaf and tuber used as vegetable in parts of Karnataka
<i>Chlorophytum tuberosum</i>	Leaves used as vegetable, medicinal plant
<i>Asparagus racemosus</i>	Swollen roots used for pickling, medicinal health food, wild gathered
<i>Aerva lanata</i>	Leafy vegetable, weed, medicinal use
<i>Bambusa arundinacea</i>	Tender shoots cooked as vegetable or pickled
<i>Kedrostis rostrata</i>	‘Appakovaithalai’ – wild gathered leafy vegetable in rain shadow areas
<i>Moringa concanensis</i>	Leafy vegetable, rain shadow region of Western Ghats
<i>Amaranthus viridis</i>	Kuppaikeerai, a weed used as leafy vegetable
<i>A. spinosus</i>	Mullankerrai. A weedy medicinal leafy vegetable for urinary complaints
<i>Tragia involucrata</i>	‘Vallichoruthanam’, leaves and clippings cooked as health vegetable in Malabar, Kerala
<i>Acalupha indica</i>	Chinni-tender leaves cooked in rain shadow areas like Chinnar, Kerala
<i>Celosia argentea</i> var. <i>cristata</i>	Cultivated or escape; stem clippings used as vegetable
<i>Cnidocolus chayamansi</i>	‘Chayamansa’, exotic; but localized in this region as leafy vegetable; tasty and also used for diabetic cure
<i>Cassia occidentalis</i>	‘Ponnariveeran’, flowers cooked and eaten
<i>Passiflora quadrangularis</i>	Exotic, tender fruits cooked as melon or cucumber substitute in curries
<i>Cucumis metuliferus</i>	Exotic. Tender fruits eaten as salad; high shelf life
<i>Curcuma amada</i>	Mango ginger. Rhizome used for pickling and also in chutney preparation
<i>Leucas aspera</i>	Leafy vegetable; weed
<i>Solanum nigrum</i>	Manathakkali in Tamil leafy vegetable, wild gathered. Fruits also edible.
<i>S. torvum</i>	Tender fruits cooked similar to brinjal, wild/weed
<i>S. macrocarpon</i>	Occasionally cultivated vegetable of Western Ghats

Table 3. Alternate use of other cultivated crops as vegetable

Species	Remarks
<i>Xanthosoma sagittifolius</i>	Cultivated for its tubers (New Cocoyam) but petiole and tender leaves are also cooked as vegetable
<i>Colocasia gigantea</i>	Leafy vegetable, petiole also cooked
<i>Amorphophallus paeoniifolius</i> var. <i>campanulatus</i>	Elephant foot yam; Mainly cultivated as a tuber crop. Tender petiole, young leaves and flowers are cooked as vegetable
<i>Musa × paradisiaca</i>	Male flowers of almost all cultivars except Robusta are used as vegetable. <i>Monthan</i> is an exclusively vegetable banana. Pseudostem and sucker rhizome also cooked.
<i>Cajanus cajan</i>	The fully filled in pods after depodding used as vegetable in Southern Western Ghats region
<i>Artocarpus heterophyllus</i>	Jack fruit. Tender fruits, seeds, core, unripe flakes all cooked as vegetable
<i>Emblica officinalis</i>	Fruits used in pickle and chutney and also curried.

Lablab bean is cultivated in almost all home gardens in the drier tract. Vegetable type red gram is cultivated occasionally in home gardens and also on the bunds of paddy fields. *Solanum macrocarpon* is an exotic vegetable occasionally cultivated in homestead in a similar way to brinjal. *Capsicum frutescens* (Bird eye chilli) is an essential component of all kitchen gardens esteemed for its hot green fruits used in ethnic cuisine. Its leaves are also cooked as vegetable by Wayanad tribals. Genetic erosion is very high in tropical vegetables of Western ghats due to replacement by more favoured crops and abandoning of niche vegetables.

SUMMARY

Western ghats are one among the four megabiodiversity hotspots of India, out of the 36 such

designated hotspots across the globe. Irrigation availability, extended monsoon, no or mild winter and cool climate in the hills, altitudinal and topographic variations, all permit year round cultivation and availability of one or more vegetables throughout the year. Diversification, popularisation of potential vegetables, value addition and processing are required for promotion of these less popular Indigenous and minor vegetables of Western ghats.

For further interaction, please write to:

Drs Joseph John K., M Latha, K Pradheep and A Suma, ICAR-National Bureau of Plant Genetic Resources, KAU (PO), Vellanikkara, Thrissur, Kerala 680 656.
Email: josephjohnk@rediffmail.com



Brinjal as National Vegetable

T. Janakiram, Assistant Director General, (HSI)
Horticulture Science Division, ICAR

“We have national fruit mango, national flower Indian lotus, national tree banyan, national bird peacock and national animal Bengal tiger but not national vegetable. We can propose Brinjal as National Vegetable, since brinjal and their progenitor species are believed to be originated in India and also looking into wide range of variability and its usage as important vegetable consumed in India.”



First Vegetable Science Congress on Emerging Challenges in Vegetable Research and Education (VEGCON-2019) organized by the Indian Society of Vegetable Science during 1-3rd February, 2019 at AU, Jodhpur, Rajasthan.