

**DIVERSITY, USE PATTERN AND MANAGEMENT OF WILD FOOD PLANTS OF
WESTERN GHATS:
A STUDY FROM WAYANAD DISTRICT**

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I. Introduction

1. Practice of digging up roots and tubers and gathering fruit and nuts from wild are almost universal, particularly during hunger periods (Gammie, 1902; Fernold & Kinsey, 1958; Medsagar, 1975; Bell, 1995). Studies on such practices in various parts of the world show collection of wild food plants is no more an affair of the poor, and wild food is not just an uncivilized food. There are at least 3000 edible plant species known to various human societies since long past, but most of them remain neglected or under utilized (FAO, 1982, 1984, 1989; Falconer, 1990). Wild leafy greens, roots and tubers, fruits and seeds and mushrooms offer a range of vitamins and minerals, add flavor and diversity to the grain-dominated human diets and further contribute to the household income and health security of the poor in the world. However, unlike the kind of studies take place on wild foods such as sea fish, sea weeds or whale meat that are done with an objective of exploitation of such resources, wild plant species have not been subjected for any serious studies that unravel the level of qualities or apply the multiple benefits of this resource.
2. In India, a number of publications that dealt with wild food plants and their role in the household food and nutritional security of tribal and rural families are available (Jain, 1964; Singh & Singh, 1981, Maheshwari, 1986, Arora & Pandey, 1996). Generally, wild foods plants are classified into different categories based on either their seasonality, type of harvests or the mode of usage (Negi, 1994, Guinand *et al.*, 2001).
3. Western Ghats of India is known for occurrence of a range of wild food plants. Arora & Pandey, (1996) reported 1532 wild food species as edible, mostly from the Western Ghats. They categorized wild food into five groups based on the parts of the plant consumed namely, tubers and roots; leafy vegetables and greens; buds and flowers; fruits; seeds and nuts. Most of the publications related to wild food provide largely information on forest derived foods. However, there are various other landscapes outside forest areas, for example, paddy fields, wayside bushes, canal banks and the agricultural fields also yield diverse wild foods (Ratheesh *et al*, 2003, Ratheesh & Kumar 2008).
4. This paper discusses results of two separate studies that were carried out in Wayanad district of Western Ghats with an objective to know the distribution, use pattern and

mode of management of wild food plants. The study was done amongst the forest dependant tribal communities of the region. Four major groups of wild food plants such as leafy greens, tubers, mushrooms and fruit and seeds are described in this paper.

II. Study Site: A hot-speck in Western Ghats

5. Wayanad district is known for its biodiversity richness as well as its fragility to anthropogenic and climatic pressures. Heterogeneity of the landscape diversity of the district varying from forests, bushes, thickets, rocky grass lands, fallow fields, springs, streams, canals and wetlands was prominent till recent past. All major forest types are seen in the district. A sizable forest area falls under the Nilgiri Biosphere Reserve and with many rare, endemic and threatened flora and fauna. A floristic study of Wayanad district revealed that there are 2034 total flowering plants species belonging to 903 genera and 171 families, which form nearly 49% of the flora of Kerala state (4679 taxa) and > 10% of flora of India (Ratheesh 2009). 338 taxa of flowering plants in the district are endemics of Western Ghats (18 %), of which 59 are restricted to Kerala and 15 species exclusive to the district. Many species from this district entered in the Indian Red Data Books and its continuing a large number of once commonly available species of the region become highly threatened.
6. The district used to provide habitats for wide spectrum of genetic diversity in the form of landraces in food crops and plantation crops. About 100 rice varieties were known in cultivation, suitable to different land types and geo-climatic peculiarities. The rice genetic base has now narrowed down to around 15-20 rice varieties. Vegetable and tuber crops occupy a prominent place in edible crop diversity of the district. 20 odd pepper varieties and host of pulse varieties are few other genetic resources to highlight the richness of genetic diversity.
7. Geographically, it is a medium elevation plateau (with an area of 2136 sq. km.) where the north-west corner of Western Ghats (the Nilgiris) gradually descends and meets the Deccan plateau in the north latitudes 11° 26' 28" and 11° 58' 22" and east latitudes 75° 46' 38" and 76° 26' 11". These mountainous terrain lofts at an altitude of 700m to 2100m above MSL and experiences salubrious climate with maximum day temperature of about 32 °C and night temperature ranges 15 °C -19° C during half of the seasons in the year. In a broad sweep classification Wayanad district is divided into two ecological zones – south western part & north- eastern part based on rainfall, climate and vegetation. The southern western part is the high precipitation area, getting up to 3000 mm rain, where as the north- eastern area bordering Karnataka state receive rain <1500 mm. The relative humidity in monsoon season is about 90% and in summer it comes down to 72%.

III. Methodology

8. Two separate studies were undertaken with a gap of 5 years. The first part was in August 2001 to July and second part was undertaken after 5 years in 2008-2009. The studies were involved extensive field surveys and data collection lasting through all the seasons of a calendar year. Study findings were subjected to analysing and validating with key 'knowledge holders' from the communities.

III. (i) **Socio-cultural groups**

Wayanad has the highest concentration of tribals in Kerala, about 17 % of the total population of the district. The dominant tribal groups are *Kurichiya*, *Kuruma*, *Paniya*, *Adiya* and *Kattunaikka*. For this study Paniya, Kattunaikka and Kuruma were included considering their high dependence on wild foods. Paniya are predominantly a landless group working as wage labourers and living close to agricultural landscapes, particularly the paddy fields. Kattunaikka are traditionally live closer to forests whereas Kuruma are a settled community, living in joint families.

III. (ii) **Study sites**

9. Five study sites were chosen, in which 4 were from the wet zone and one from the dry zone. Preference had been given to wet area because of the greater concentration of tribal communities in this part and its biodiversity richness compared to the other region. From the five sites, 15 locations were selected, in which eleven fell in the wet zone and four in the dry part (Table 1). The study sites at each of these locations were selected at random using a grided map of the district. The relatively greater dependency of Paniya community on wild food was reflected in the selection of five of their settlements in the target group. One Kattunaikka colony from the dry zone and two from the wet zone were included. As lifestyle and wild resource dependency is uniform among Kuruma, one colony each from the dry and wet zones was selected.

III. (iii) **Data collection**

10. A fairly comprehensive survey and review of the available literature on wild foods preceded field level data collection. The tools used for primary data collection included Survey, Interviews (individual and groups) and PRA methods. A total of 362 knowledge holders (men, women and children) of different age groups were directly interviewed (Table 2). The data collection attempted to enumerate and categorise the wild species used as food, the gender dimensions of its management. The team visited each location, meeting at least 25 families from each community, often camping in certain remote locations for a few days. The meetings were carried out either in gender specific groups or in mixed gender groups. People who seemed comparatively more

knowledgeable from among the group were contacted individually and in-depth interviews were held with them. Informal discussions with the community often provided leads to individuals with specific knowledge about wild food and its management. From each community 20 such key knowledge holders were selected for sourcing more detailed and in-depth information. In the second study, the team met again most of these key individuals and elicited information on the change in pattern of wild food consumption and availability.

11. For collection of plant samples, a series of transects were used at random covering various landscapes with in an average radius of 3-5 km of habitations in all the 15 locations. Specimens were collected for both herbarium and *ex-situ* collection. The relevant information about all the key knowledge holders was recorded in acknowledgement of their contribution to the study and in recognition of their rights as holders of traditional knowledge. It was observed that different communities have different names for the same wild food species; also wet and dry zones had different nomenclature for the same plant. Thus it became imperative to validate the identity and information about different species through group meetings with key knowledge holders. *Ex-situ* collections, herbarium specimens, wet collection of mushrooms etc. were shown to them to verify the respective names.

Table 1: Profile of the study sites

Ecological zone	Area	Location	Socio-cultural groups	Land use (main)	Land use (subsidiary)
WET	Kalpetta	Puthoorvayal	Paniya	Paddy field	Forest, streams, plantation
		Puthoorvayal	Kuruma	Paddy field	Forest, streams, plantation
		Puthoorvayal	Hindu	Paddy field	Plantation
	Pozhuthana	Mutharikkunnu	Paniya	River	Paddy field, plantation, forest
		Mutharikkunnu	Muslim	Plantation	River
	Banasura-mala	Bhappanammala	Paniya	River	Forest, plantation
		Bhappanammala	Kattunaikka	Forest	River, plantation
	Chooralmala	Attamala	Paniya	Forest	River
		Aranamala	Kattunaikka	Plantation	Forest, river
		Elavayal	Christian	Plantation	River
Chooralmala		Muslim	Plantation	River	

DRY	Muthanga	Ponkuzhi	Kattunaikka	Forest	River, paddy field
		Kumizhi	Paniya	Forest	River, paddy field
		Kumizhi	Wayanadan Chetty	Paddy field	Forest, river
		Thakarapady	Kuruma	Paddy field	Forest, river

Table 2: Total number of knowledge providers

Site	Informants – age wise											
	Paniya			Kattunaikka			Kuruma			Others		
	*C	*A	*O	*C	*A	*O	*C	*A	*O	*C	*A	*O
Puthoorvayal	12	8	9	-	-	-	10	15	12	10	10	10
Muthanga	9	6	7	12	15	16	10	12	12	5	6	7
Banasuramala	8	7	9	8	7	8	-	-	-	-	-	-
Poozhuthana	12	8	15	-	-	-	-	-	-	4	5	5
Chooralmala	-	-	-	-	-	-	-	-	-	12	8	12
Attamala	-	4	6	-	-	-	-	-	-	-	-	-
Aranamala	-	-	-	8	5	6	-	-	-	-	-	-
Total	41	33	46	28	27	30	20	27	24	30	29	34
	120			85			71			90		
Key informants	20			20			20			20		

*Age groups – C = <15, A = 16 to 40, O = >40 • Total number of informants = 366 • Key informants

= 60

IV. Food Plant Diversity

IV. (i) Roots & Tubers

12. Wild roots and tubers are still a major source of food consumed by the three communities. Balakrishnan et al (2005) reported collections of 17 wild yams (10 species and 7 varieties of Dioscorea) mostly from species such as *D. pentaphylla*, *D. wallichii*, *D. hamiltonii* and *D. belophylla* from Wayanad and adjoining regions. In this study there are 38 distinct wild roots & tubers are identified (Annexure 1). Taros and Yams contribute much of this diversity and serve as a 'life saving' group to all the three communities. Of these, 19 are species/varieties of Dioscorea or wild yam,
13. The communities classify each member of wild yam, based on characteristics like edibility, taste, colour, size, direction of growth, fiber content, cooking properties and occasionally the proliferation underground. Kattunaikka call these tubers as 'Kalasu'. Among the varieties known to them, Vennikalasu (*D. hamiltonii*), Hehkkukalasu (*D. belophylla*), Kavalakalasu (*D. oppositifolia*) are seen in interior evergreen and moist deciduous forests, and Erakalasu (*D. wightii*) in rocky grasslands. Noorakalasu (*D. pentaphylla*), Narakalasu (*D. wallichii*), Hendiridaekalasu (*D. bulbifera*) are found in wayside bushes and Boojikavalakalasu (*D. pubera*) in marshy areas. Wild yams are collected from almost all such landscapes, but more frequently from forests and other bushy habitats.

Diversity and Use pattern

14. Tubers of *D. hamiltonii*, *D. oppositifolia* and *D. pentaphylla* var *pentaphylla* are most frequently consumed. Among the different species of dioscorea, Nallanoora (*D. pentaphylla* var. *pentaphylla*) is the most commonly consumed tuber. As the name indicates, 'nalla' means safe or good to eat. The tuber is single, cylindrical, up to 1 m. in length, less fibrous, powdery when cooked and tastes good. This variety is common in the fringes of deciduous forests. Korana (*D. pentaphylla* var. *rheedii*) is commonly used for various culinary preparations, occasionally as stewed cake, because of its high fibre content. Unless thoroughly washed before cooking it can leave an itching sensation in the throat. Chenakorana (*D. pentaphylla* var. *communis*) has got the shape of a 'chena' (elephant foot yam) and is fibrous in nature. Hendikorana (*D. pentaphylla* var. *linnaei*) tuber has got the shape of 'hendi' (wild boar in the Kattunaikka dialect), with thick black coloured root hairs all over the tuber. Kavala (*D. oppositifolia*) is another very popular tuber among all the tribes of Wayanad. It is excellent in taste and is commonly found in moist forests on which the Kattunaikka community depends more. Salukalasu, which identified as *D. tomentosa*, is not consumed regularly due to its high mucilaginous content, and is eaten only during times of acute famine. It has peculiar kind of fibres that leave an itching sensation when consumed, particularly on children.

15. Kattunaikka are well versed in the identification of dioscorea in terms of its availability, habitat and associated plants. They are also adept at identifying the matured and sweet tuber ideal for consumption. The tubers that are deeply rooted, for example *D. hamiltoni*, are usually dug out by men. Occasionally whole families go in search of tubers, which could take up the whole day and collect enough quantities. There are instances when this can stretch up to a week. The collected tuber is stored in the open, inside the huts. Almost all the roots and tubers require processing to make them edible and palatable. A wide range of methods is adopted for processing the tubers. The tuber of Kottunoora (*D. hispida*) requires thorough processing before consumption. The chopped tubers are wrapped in a white cloth and kept in running water in the streams for over 24 hours before being cooked. No other community in the study area consumes this variety as it is considered toxic.
16. Kattunaikka have attempted to introduce several of *Dioscorea*, into their home gardens. Nallanoora and Noorakorana are preferred for cultivation, as they are tastier and more nutritious than other varieties. Some families of Ponkuzhy Kattunaikka colony have introduced the highly delicious and rare Boojikavala (*D. pubera*) in their backyards. The selection of species for introduction chiefly depends on the availability of the variety and its cooking quality. The varieties good for steaming and roasting (depending on the fibrous nature of tubers) are also given importance in the collection. After the tuber is dug out, the apical portion of it, along with the stem (vine) is put back in the pit and filled with soil up to three fourth levels for its regeneration. Another piece is placed in a small pit close by to confuse the wild boars that are in constant competition with the tribals for wild tubers.
17. Paniya community, use roots and tubers of 19 plant species as their food. As in the case of Kattunaikka, dioscorea form an important source of their food. They consume 9 kinds of dioscorea tubers, in which the most preferred are Kavalakizhangu (*D. oppositifolia*) and Noorakizhangu (*D. pentaphylla* var. *pentaphylla*). They consider the Noorakizhangu and Kavalkizhangu to be rich in 'Podi' (starch) and 'Kozhuppu' (fat) and the Narakizhangu (*D. wallichii*) to be rich in 'Naru' (fibre). Noora and Kavala do not need any detoxification before cooking.
18. 6 varieties of taros are found in pure wild in abandoned fields and marshes and consumed mainly by Paniya and Kattunaikka. A variety named Karim Chembu is adored for its medicinal properties like curing rheumatic complaints, purifying blood and improving eye health. Some of the other minor roots and tubers consumed are Nannari (*Hemidesmus indicus*), Muthanga (*Cyperus rotundus*), Sathavari (*Asperagus racemosus*), Unnithandu (*Costus speciosus*), and various species of wild curcuma and wild ginger, which are important ingredients in food supplements and certain traditional medicines.

IV (ii) Leafy greens

19. Wild leaves are the most widely consumed wild food plants. Most of such plants are locally referred to and classified as 'weeds', sprouting and flourishing after rains. Women use them in soups, stews and relishes that add flavor to staples. Among the three communities studied, wild and weedy greens form the most regularly used food supplement in the three tribal groups and are of great dietary importance among Paniya families. The study identified 84 wild edible greens, but only a few species are widely used (Annexure 1). For instance, Paniya women and children regularly collect only about eight species, the Kuruma and the Kattunaikka tribes zero in on just four such species regularly and others often make do with just three types of wild edible leaves. The household survey revealed that Paniya families consume about 72 species followed by the Kattunaikka who consume 35 species, the Kuruma about 22 types of wild edible leaves and the others restrict themselves to between 3 and 6 types of leafy greens.

Diversity and Use pattern

20. Most of the leafy green species are herbs (90%) and very few are trees. It was found that women play a key role in the collection and processing of wild edible greens. As food providers for the family, they alone, by and large, continue to possess the knowledge related to its usage. An analysis of dependency on various landscapes for collecting these plants shows that wayside and open areas provide the maximum species (28) followed by thickets and forest (20 species), paddy fields and associated ecosystems (18), riversides (13) and the marshy areas (9).

21. Among the frequently eaten greens are species like Ponnammkanni (*Alternanthera sessilis*), Mullencheera (*Amaranthus spinosus*), Kuppacheera (*Amaranthus viridis*) and Mudungachappu (*Solanum nigrum*) (Table 3). All the communities studied consume them frequently (4 to 5 times a week). Expectedly, these species are available conveniently throughout the season near their habitations and are readily accessible to women and children. One wild species regularly eaten, which is strictly restricted to forest or evergreen bushes is Maracheera (*Embelia tsjeriam-cottam*) but it is consumed only by the Kattunaikka community. Greens that fall in the category of less frequently eaten are used 2-3 times a month based on their abundance, availability and accessible supply. Aliyanchappu, (*Zehenaria mysorensis*), Kattuthakkali (*Passiflora calcarata*), Kallurukki (*Scoparia dulcis*), Maracheera (*Waltheria indica*), Muthil (*Centella asiatica*), Aalanchappu (*Bidens biternata*), Kuriyankaya (*Diplocyclos palmatus*) and Kozhuppacheera (*Trianthema portulacastrum*) fall under this category. Many of these species, except *Bidens biternata*, *Scoparia dulcis* and *Centella asiatica* do not grow in abundance near the habitations and are mostly found in the hills, often as weeds in the coffee plantations. All the three communities gather these and consume them in combination with other

wild food species. For example, Paniya women prefer to cook Muthil (*Centella asiatica*) mixed with Kozhuppacheera (*Trianthema portulacastrum*) and Kattuthakkali (*Passiflora calcarata*) with crabs or fish. The greens, according to them, tastes better this way than when cooked separately. It is however becoming increasingly difficult to fetch different varieties in a single visit and the practice is now often given a go by. Moreover, some of these greens eg. Kuriyankaya (*Diplocyclos palmatus*) need to be rather laboriously processed to remove the bitter taste and make it palatable, which itself is a deterrent to its frequent consumption.

22. Greens like Koombichappu (*Adenia hondala*), Kayalkkali (*Bambusa arundinacea*), Nakkuneety (*Ophioglossum reticulatum*), Kattukaipa (*Momordica dioica* and *Momordica subangulata*) Kozhivalan (*Alternanthera bidentata*) and Vattachappu (*Marselia* sp.) are greatly preferred but their consumption does not match the revealed preference. These species are seen to be not always readily available, not easily accessible and are seasonal. Species like Kattumudunga (*Lycianthes laevis*), Kozhivalan (*Alternanthera bidentata*), Koombichappu (*Adenia hondala*) and Panchithalu (*Cryptocoryne retrospiralis*) are rare in distribution and found only in the hills. Though the dishes made of these are well relished by all the members of Paniya families, their collection is now restricted to the rare forays they make in to the interior forests in search of firewood or honey.
23. But several of the edible leafy species, in fact a large majority of those identified, are seldom consumed, despite their abundance, availability and accessibility. Some of these are Cherukadaladi (*Cyathula prostrata*), Mukkapeera (*Mukia maderaspatana*), Chorakam (*Polygonum glabrum*), Naikkaduku (*Cleome viscosa*) and Brahmichappu (*Bacopa monnieri*). All these are species that are available nearby, but are used only when the more preferred varieties become scarce or inaccessible. Each community is aware of these species, but gathers them only during emergency conditions. The Paniya families, for instance, know over 60 such species but use them only during times like severe monsoon when there is acute food scarcity. Some species are gathered specifically for pregnant or lactating mothers for their medicinal properties.
24. Paniya women have learnt to use even some of the invasive species like *Bidens biternata* as greens. This plant is referred to by the non-tribals as 'Kandonekkuthy', for its numerous persistent calyces that latch on to the passer by when brushed against. However, they have named it Alanchappu in deference to its rejuvenating properties. Alanchappu literally means leaves that rejuvenate.
25. Compared to the Paniya, the Kattunaikka community use less leafy greens (49 species) and this can partly be attributed to their lower dependency on agricultural and associated landscapes. However, they regularly include several greens in their diet. Marakkeera, (*Embelia tsjeriam-cottam*) Maradusoppu (*Capparis* sp.), Kannisoppu, (*Commelina bengalensis*) and Hattakheerai (*Justicia nilgherrensis*) are among the greens regularly consumed by the community. Among the 102 wild greens the study identified,

16 species are exclusively consumed by the Kattunaikka community. Most of these are pure forest species, which are not generally accessed by the Paniya or Kuruma women. Many of these species are highly seasonal and depend heavily on soil moisture for their growth. During summer the Marakkeera and Maradusoppu are available, where as many of the other species sprout only during rainy season. Maradusoppu and Marakkeera are available throughout the year not merely because they are evergreen shrub species but also because their use as leafy green is restricted to these communities, thus ensuring that there is no over exploitation.

26. Kuruma women are the least dependent on wild leafy greens. The reasons for the reduced dependency range from low preference of the men and children in the family to wild leafy greens, availability/ accessibility/time constraints to perceptions that accessing wild greens for food reduces social prestige. Invariably, in all the Kuruma households, there are home gardens, which are maintained well by women and this may be another reason for their lower dependency on wild greens.
27. It was noted that some of the wild greens are exploited not only for their leaves but also for other parts like flowers in the case of Koombichappu (*Adenia hondala*), fruits in the case of Kattuthakkali (*Passiflora calcarata*) and petiole, corm and fruits in the case of Karimthalu (*Colocasia esculenta*). Women thus use the resource in a variety of beneficial ways, not restricting themselves to just the commonly used leaves. They adopt various processing methods to make the edibles consumable and palatable. For example, Kattunaikka women use different species of Kattuchena (*Amorphophallus* spp.) for the corms, but only after it is washed thoroughly several times in fresh water and then boiled in tamarind water. This takes the 'bite' - an irritating itching sensation in the throat when eaten otherwise - off. Women patiently do such time consuming chores to make several varieties of wild food plants edible and tasty. Similarly the pods of Kattupayar (*Mucuna monosperma*), with its prickly and irritable bristles have to be peeled off and boiled in tamarind water to make it edible.

28. Colocasia “thalu” (petiole) is the most widely used green by the Paniya community. Three varieties of Colocasia from three different habitats are collected and their names are associated with the habitat from where they are collected. Thalu is considered to strengthen the bones and improve the immunity of body. Young girls are fed on a diet of thalu during their menstrual periods to improve their immunity. Women, while collecting the leaves, irrespective of the species, harvest only the required quantity, that too from a larger number of available plants of the species. In case of Vayalthalu and Kollithalu they always pluck the leaves in a manner that a sizable portion of the petiole is left to avoid the corm of the plant from decaying. This is despite the fact that the petiole is itself an important food supplement for them; but it is never harvested in a way that would cause damage to the underground corm. To ensure the long-term availability of some leafy greens like Karimudunga (*Solanum nigrum*), Kuruma women collect its mature fruits separately and throw them in the near by fields and home gardens, hoping for germination and long term availability. They desist from the use of inorganic fertilizers or chemicals in their agricultural field and do not disturb the fields where wild leafy vegetables grow, in order to ensure the long-term availability of the greens.

Table3: Most frequently used greens

No	Paniya	Kattunaikka	Kuruma	Others	Botanical name
1.	Ponnamkanni	Ponnamkanni	Ponnamkanni	-	<i>Alternanthera sessilis</i>
2	Mudungachapu	-	Kattuthakkali	Chukkootti	<i>Solanum nigrum</i>
3.	Churuli	-	-	-	<i>Diplazium esculentum</i>
4.	Mullancheera	Mullankeerai	Mullancheera	-	<i>Amaranthus spinosa</i>
5.	Mullancheera chuvappu	-	Cheera	-	<i>Amaranthus spinosa</i>
6.	Kalicheera	Kuppakeerai	Vazhacheera	-	<i>Amaranthus viridis</i>
7.	Karinthal	-	-	-	<i>Colocasia esculenta</i>
8.	Kollithal	-	-	-	<i>Colocasia esculenta</i>
9.	-	Marakeerai	-	-	<i>Embelia tsjeriam-cottam</i>
10.	-	-	-	vasalacheera	<i>Basella alba</i>

IV (iii) Fruits and Seeds

29. Information on 62 fruits and seeds (fruits 55, seeds 7) was collected (Annexure 1). Among the fruit yielding plants, 33 are trees, usually found in forests and hills. Fruit trees like Plavu (*Artocarpus heterophyllus*), Mavu (*Mangifera indica*), Athi (*Ficus racemosa*) and Njaval (*Syzygium cumini*) are protected on waysides and in the agricultural landscapes in many locations in the district. The fruits of these trees (except ficus) are widely used across communities. Various ficus varieties are protected, either for their sanctity or because the birds feed on them or they host nocturnal animals like bats which are beneficial to the crops. Paniya are the largest consumers of various wild fruits. About

50 species are consumed by this community alone, largely collected from forests, wooded hills or such unmanaged areas. The non-tribal communities restrict themselves to the fruits of jack, mango, gooseberry and njavaal trees and generally avoid the lesser-known fruits from the forests.

Diversity and Use pattern

30. It is observed that the species like, Chakka (*Artocarpus heterophyllus*), Eenthukaya (*Cycas circinalis*), Putharichunda (*Solanum anguivi*), Nellikka (*Emblica officinalis*) and Ayanichakka (*Artocarpus hirsutus*) are collected not for the own individual consumption, but rather for all the family members. It is not an unusual practice for them to leave the upper branches of fruit trees unharvested or electively harvested for the birds and other animals to savour. The Kattunaikka women of Ponkuzhy colony were seen adhering to this norm unfailingly. Unripe jack fruits as well as seeds (Chakkakkuru) are cooked as side dishes to go with rice. There are a number of culinary items like 'Chakkapuzhukku', 'Chakkathoran', 'Chakkapayasam' 'Chakkakkuruthoran', 'Chakka chips', etc, prepared out of the fruit kernel and seeds. In most of the settlements, the jackfruit trees were seen to be well managed and protected largely by women. Since it is a seasonal fruit, much attention is given to collecting and storing the maximum seeds possible during the season. Invariably, the seeds are stored in clay pots after smearing them with dry soil.
31. Another important fruit tree is Eenthu (*Cycas circinalis*). This is a rare plant observed in the study area, which is mainly conserved for edible seeds and ornamental leaves. A number of dishes are prepared out of this fruit after thorough processing. During the fruiting season women take special interest in collecting the seeds and store them dried for future use. The women consider the flour made out of this particular fruit to be of high nutritional and medicinal value.
32. Nellikka (*Emblica officinalis*) is one of the most widely collected fruit (an important NWFP) and is a key source of income for Kattunaikka. Both women and men are engaged in the collection and sale of Nellikka. For the children of Kattunaikka and Paniya communities, many of the wild fruits are like what toffees are for urban children. Women and men of Kattunaikka and Paniya make it a point to bring home berries and fruits when they return from their sojourns, for whatever purpose, in the forests. The children themselves are greatly adept at identifying various edible fruits.
33. Another important wild fruit collected for market is Kattu Kudampuli (*Garcinia gummigutta*). Women, children and youth can be seen engaged in door to door marketing of this fruit, in towns and dwellings of plantation labour. Men, women and children of the Paniya community of Attamala forest are actively engaged in Kudampuli collection and processing. During the fruiting season men and women stay put in the interior forest itself, to do the collection, processing and drying of Kudampuli, which is in excellent demand.
34. The most important seed of forest is that of bamboo (Mulayari). During the flowering season of bamboo, this becomes an all too important in-gradient in the diet of Paniya and occasionally the Kattunaikka. Forest bamboo thrives in large populations covering

wide forest expanses as can be seen in the Muthanga Wildlife Sanctuary area. Women go to the bamboo brakes before fruit setting and clear the undergrowth and prepare a clean bed for the seeds to fall. Sometimes, the ground around big canopies of bamboos is even smeared with cow dung, an indication of the value the tribals attach to this rare bonanza from the forest. The collection may continue for days together and men and children join in gathering the seeds. It is often seen that the entire family stays put amidst the bamboo brakes through the flowering period. The collected grains are carefully stored for future use, accentuated by the popular belief that a period of famine that follow the flowering of bamboo. Bamboo seeds are put to a variety of uses, the most common being as gruel or to make the popular steamed pancake 'puttu' for the preparation of which the grains have to be coarsely ground. Considered highly nutritious and relished by every one in the family, bamboo seeds are also sought after by the non-tribal communities.

IV (iv) Mushrooms

35. Nearly 40 distinct mushrooms are known edible and half a dozen of them are highly preferred (Annexure 1). The availability is seasonal and specific to their habitats and host plants. This delicacy is usually available after the onset of monsoons – both Edvappathy (south-west monsoon) and Thulavarsham (north-east monsoon). The common habitats where mushrooms are found are: open areas in plantations, forest edges, alongside forest paths, inside bamboo brakes, fallow fields, on termite mounds and riversides. Mushrooms are also seen on tree trunks and decayed woods in the forested areas and plantations. The most commonly consumed mushrooms are Arikkoon, Puttukoon and Perumkali, which are highly delicious and available in plenty, though they are very specific to peculiar habitats. For instance, Arikkoon and Puttukoon are seen only around termite mounds. Perumkali variety is seen in moist and exposed open areas where the remnants of old termite mounds can be traced.

Diversity and Use pattern

36. Kattunaikkas consume a greater variety of mushrooms, as many such species are conveniently available in the forests which Kattunaikka men and women frequently access. Around 33 species of mushrooms, called 'Anavae' in their dialect, supplement their nutritional requirements, which are classified into three groups, based on the habitat where they sprout. These are: Maranavae -mushrooms seen on the bark of different trees, Huthaanavae (*Termitomyces* sp.)-those seen on termite mounds and Mannanavae - which are on the forest floor and associated habitats. The Maranavae found only on certain host species are consumed by the community; preference being to trees belonging to *Syzygium*, *Dalbergia*, *Mangifera*, *Lagerstroemia*, *Erythrina*, *Persea* and *Bamboo*. These mushrooms are named after the host trees; for example, the Anavae seen in Njeral (*Syzygium cumini*) is called Njeralanavae, on Jal (*Dalbergia latifolia*)

Jalanavae, on Kaval (*Erythrina indica*) Kavalanavae and so on. There are three species of Huthanavae. The one, which is milky white in colour, is called Vellanavae, pale white in colour is Ummanavae and the large sized off-white coloured is typical Huthanavae (*Termitomyces* sp.). The community considers the mushrooms seen associated with 'Huthu' (termite mount) to be non-toxic and do not feel the need to process it in any manner. Children of this community would even eat such mushrooms raw, without any fear. The Ummanavae and Vellanavae (*Termitomyces heimii* Natarajan) usually sprout in dense groups, while Huthanavae (*Termitomyces* sp.) grow either singly or in sparse groups. The Mannanavae, which sprout on soil, are also classified into three groups based on the growth habit, i.e, mushrooms which sprout in groups or singly. Around 15 different kinds of this type of mushroom are consumed by this community.

37. 'Kumman' is the Paniya word for mushrooms, which is considered a delicacy. This community uses about 25 species of Kumman, many of which are collected from plantations. Mushrooms are classified into two groups by them: Marakkumman (those seen on trees) and Mannukkumman (those seen in soil). These are further classified based on substrate, shape, size etc. For example Valakkumma' refers to mushrooms that sprout in Valam (cowdung- compost), Vaikkolkumma' (sprouts on Vaikkol-paddy straw), Kathukkumman (the one that has the shape of 'Kathu'-human earlobes) Ambukkumman (that has the shape of 'Ambu'-arrow). The Kathukkumman which is seen in plenty commonly on Murikku (*Erythrina indica*) during rainy season is consumed only by this community.
38. Kuruma refer to mushrooms as 'Koonu', the same popular malayalam word for it, and it finds pride of place in the family menu when available. Around 14 species are consumed by Kuruma, who, by and large, only prefer the 'Koonu' seen on soil, especially, those associated with termite mounts. The most commonly consumed mushrooms are Perumkoonu, Arikoonu, Nedumthali and Puttukoonu (*Termitomyces* sp.). In contrast to other communities, Kuruma women preserve and store the mushrooms for future use after properly drying it. The dried mushrooms can be stored till the next season without losing any of its qualities. Among them collecting mushrooms is considered exclusively the woman's job. They collect mushrooms like Arikoon and Puttukoon, which considered the more safe varieties, also require hardly any processing. The mushrooms which can be processed and stored, in general, have less mucilaginous substances and soft fiber coatings. Mushrooms are kept in turmeric water for a day, bundled and smoke dried above the hearth.
39. Kattunaikka women, among the others, are more adept at distinguishing between poisonous and non-poisonous varieties, usually by odour and colour. Even from a distance they can smell out toxic and non-toxic mushrooms and identify the location. While collecting mushrooms from tree trunks, maximum care is given to harvest only the fruiting body and spare the basal portion to sprout again. Children of the

Kattunaikka community are very enthusiastic to set out for mushroom collection, since some varieties are palatable even eaten raw.

40. Paniya women in general distinctly remember the time of the year and the specific locality where mushrooms are available. It is believed that some varieties of mushrooms recurringly sprout exactly at the same time of the year and at the exact location. Paniya women have to walk long distances these days for mushrooms as they are seen only in less polluted habitats, which are often far off from their habitations.
41. Mostly women and girls are involved in the collection, processing, preservation and preparation of mushrooms. Women, by and large, hold the knowledge about its quality, use and conservation. It is impossible to deliberately introduce mushrooms in to the home gardens, but women take interest in protecting the wild habitats and areas in the home gardens where they naturally sprout. It was noticed that across the entire tribal and non-tribal communities' women protect the termite mounds and the tree species which host certain mushrooms.
42. None of the communities in the study area collect mushrooms for sale or marketing but only for domestic consumption. The accelerated degradation of the ecological system and the growing dislocation of communities from their original habitats has not only affected mushroom availability but also brought in competition among the women of different communities for accessing this wild delicacy.

V. Discussion: Challenges in protection and sustainable management of wild food plant species

43. This study brought out the picture of knowledge and skills of three tribal communities who depend on wild plants along with their changing perception. The study shows forest/semi- wild dwelling tribal men and women have acquired knowledge about a large number of wild food plants (224 plant taxa including 40 mushrooms), and most of them accessed and utilized from the semi-wild environment. It is evident from the study that the locally available food plants play a critical and important role by providing food, nutrition, health and income to many of poor households of the communities studied. Further, the study showed contributions of women in conservation, selection and enhancement of such species and their role in the sustainable management of various landscapes and habitats which provide the food plants.
44. The results show consumption of wild plants is still common in food insecure locations. For Paniya and Kattunaikka community many of these species are not for consumption just during periods of food scarcity or other such hardships, but forms part of their regular dietary intake. Nine different landscape elements (LSE) the people of Paniya community access for such food plants in different seasons (table 4). The majority of wild foods are collected outside the forest e.g. from swampy/marshy areas, paddy fields and its fringes and bunds, wayside bushes, agricultural or unmanaged or semi-managed disturbed habitats. Different communities have different levels of access and dependency to different landscapes. For example, Paniya depend heavily on disturbed habitats. Almost all these landscapes are most vulnerable to the onslaught of a host of developmental activities, including environmentally unsuitable changes in land use pattern and causing marked changes with regard to the floristic composition and thereby the availability of many species of wild food plants. We have noted the use of wild food plants contribute to sustainable management of such landscapes, and the traditional uses indirectly helping to keep the heterogeneity in landscapes. But as no designated state custodians exist for many of these landscapes, there is a serious lack of involvement in their conservation or sustainable management.

Table 4: Utilization of various landscapes by different communities

Landscape type	User communities (in the order of dominance)				Key wild food			
	KN	P	Ku	Ot	KN	P	Ku	Ot
Forest	3 *	2	2	1	T,Fr,M, Mu	T, Mu	M	Fr
Thickets	1	3	1	1	LG	LG, Fr, T	Fr	LG
Plantations	0-1	3	2	1	LG/Mu	LG, Mu	Mu	Mu, LG
Paddy fields	1	3	2	1	LG	LG, F, Cr	LG, F, Cr	LG
Streams / river	3	2	1	1	F, Cr	F, Cr, Sn	F	F
Swamps	2	3	1	0-1	F, Cr, LG	F, C, LG	F, LG	F
Waysides	1	3	1	0	-	LG, Fr	LG/Mu	-
Grazing lands /	1-2	2	1	0	LG, Mu	LG, Mu	Mu	-

mountains								
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KN=Kattunaikka; P=Paniya; Ku=Kuruma; Ot=others

*value based on the number of species each community access from each LS type. 1-minimum; 3-maximum; T- tubers; M- meat; Mu- mushrooms; LG- leafy greens; F- fish; Cr- Crab; Fr- Fruits

45. Though there are many opportunities for developing wild food plants in the areas of food, health, nutrition and income, there are a number challenges that pose severe threats on the survival of many wild food plants of the region. Some of the most crucial challenges that need attention are described here.

1. Change in floristic composition (Invasion of Alien Species)

46. A large number of indigenous wild food plants, especially the 'weedy greens' are getting displaced by aggressive alien invasive species. The rapid spread of many alien species creates problems for the survival of large number of native species that are useful to the local communities in many ways. All open clearings like waysides, grazing lands, new plantations and the fallow paddy fields are the usual sites for green leaves collection. The climate of the district is highly suitable for the fast growth of many of these exotic species. Some of these have replaced the edible greens; for example species such as *Cassia tora*, *Alternanthera sessilis*, *Amaranthus viridis*, *Amaranthus spinosus*, *Colocasia esculenta* (Karathalu) etc. are edged out by exotics like *Lantana camera*, *Parthenium hysterophorus* or *Drymaria cordata* etc. Sizeable areas of Muthanga sanctuary are now infested with *Lantana camera* and *Chromalina odoratum*- two noxious exotics. They now thrive in the area which has been clear felled of *Eucalyptus* plantations. Interestingly, the eucalyptus plantation itself came in to being after pristine natural forests were cleared to plant them as part of the social forestry scheme! *Mikania cordata* is another troublesome weed now found in almost all the forest fringes in the district. People describe the unusual way this species choke and destroy the other plants as "Drudharastralinganam", the vicious embrace of the epic character that crushes the unsuspecting opponents to death. *Mucuna pruriense*, *Parthenium hysterophorus*, *Bidens biternata*, several species of *Blumea* are some of the quick growing alien species which have proliferated in different habitats in the study area.

47. Interestingly, some of these alien species, as mentioned earlier, are now included in their collection of greens by the Paniya women. *Bidense biternata*- (Alanchappu as the Paniyas have named it) has turned out to be a delicious supplement in their food. It is remarkable that the Paniya women have identified the rejuvenating properties of an invasive like this species that the common populace considers but a troublesome weed. The *Bidens biternata* now flourishes in all the open landscapes, particularly in the human managed ones like the coffee plantations.

2. Change in Land Use

48. It is a fact that changes in land use from traditional to modern has increased food production. Land use changes, but contribute negatively to the food security of tribal communities of the district. The paddy fields and associated wet and swampy areas of the district, which had been a veritable treasure trove of a variety of leafy greens and a host of other wild food, regularly accessed by the tribal communities, especially the Paniya and the Kuruma are now being converted for commercial banana production. Paddy fields, as they existed nearly two decades ago in Wayanad, provided food, employment and ecological security to the tribals. Apart from greens, a number of other species of high food and health value such as fish, crustaceans like crab and snails, and medicinal plants were associated with this agro-eco system. The tribal communities like Kurichya and Kuruma completely relied on paddy cultivation and this ecosystem for their food security. The Paniya community depended on paddy fields for employment. Women of this community were among the most adept at all tasks related to paddy cultivation and they depended on the wage earnings from it as their principal source of income. The paddy fields were also among their principal sources for a variety of wild food. Even today, Paniya women know and use 19 plant species from the paddy fields and its mud bunds. Besides this, a number of rituals and traditions of the Paniya and Kuruma communities are strongly intertwined with this ecosystem. From an ecological view point, the paddy fields situated in the low lying areas of the undulating terrain acts as a trough collecting and retaining a large quantity of water that is used by a number of plants and animals (most of them, of direct use to the dependent communities). Conversion of this land for cultivation of perennial crops (or, as is the recent common practice, for banana cultivation) limits the storage capacity of this "sponge" leading to water shortages in nearby wells during dry seasons, and floods during rainy seasons.

49. There is a clear need for a more rational and sustainable management of remaining wetlands and paddy fields of the district, not merely because the production of the staple food of populace is affected, but also because its preservation is inextricable linked to the food supply chain. The availability of greens, fish and crabs and a host of other locally important products and benefits depend on the wet and swampy fields remaining intact.

3. Change in Tradition and Life Style

50. Erosion of traditional knowledge related to wild food consumption continues in a faster way in almost all the locations we have surveyed. It accentuated not just by rapidly changing attitudes but more importantly by the non-availability, non-accessibility and non-use of several varieties of wild plant food. For instance, several skills the elders possess have now not been shared by the youngsters in Paniya community (table 5). There is evidence that some tribal languages/dialects are losing currency at an alarming rate, since the tribals are forced to increasingly negotiate with the outside world and that

too in the language of the mainstream communities. This is impacting on the survival of TK, since many of the terms used to describe wild species are becoming less well-known and/or are going out of usage. All the communities of the study area, however, talked about such species and seemed to know their characteristics, palatability and nutritional benefits. But even the famed wild leaf eaters like the Paniya today consider it below their dignity to be seen gathering these species from the open areas. This is despite several incidents of starvation deaths among the Paniya that are being reported. The reasons commonly attributed to this decline of interest and uses are:

- Lack of interest among the younger generation
- Non-availability of wild food at convenient sites, consequent on drastic changes in the landscape.
- Restrictions on access
- Risk of consuming chemically polluted wild foods
- Lower prestige associated with eating wild foods compared to purchased foods
- Displacement and/or relocation from their original habitats, leading to alienation and changes in lifestyle

Table 5 : Erosion of traditional knowledge of Paniya on wild food

Attribute	Number of persons possessing knowledge across the age groups					
	> 40		15 - 40		< 15	
	M	F	M	F	M	F
Identifying edible mushrooms	3	4	2	4	0	2
Identifying edible yams	4	3	3	3	0	0
Identifying edible greens	2	4	1	3	0	3
Fish catching techniques	3	4	2	2	0	0
Crab catching techniques	3	4	2	4	0	0

4. Change in plantation crop management practices

51. Coffee plantations managed in a traditional way function as important source for many wild greens and mushrooms. But, now-a -days the shade grown approach of coffee has changed into 'sun grown coffee' by completing cutting out trees and weeding out all the undergrowth in the plantations. Chemical weedicides are in use to remove the aggressive undergrowths from plantations, which have now endangered most of the indigenous greens and sprout of mushrooms. It is evident that the unscientific applications of chemical inputs in the coffee, tea, cardamom and banana plantations have considerably reduced the population of common edible greens and mushrooms.

The feeling amongst the user groups that wild greens may not be safe any more has also reduced its consumption according to these women.

VI. Conclusions & Recommendations

52. The perception we derive from the study is that the options of improving food production and resolving health and nutritional insecurity through exploiting the potential of wild food plants is a naturally sustainable, cheap and locally available alternative. Some of the wild food plants are climate resilient and can function as emergency or reserved food. For instance, several of the species and varieties of wild yams withstand severe drought and remain beneath the soil for a period of four to five years without any problem in quality or nutritional safety. We also understand, an emphasis on the development of wild food plants will help enhance and maintain indigenous biodiversity and keep the heterogeneity of ecosystems. The immediate step required is effective community level initiatives in curbing challenges like degradation of forests, land use changes, invasive alien species and erosion of traditional knowledge that greatly affect availability and access to wild food plants. The high degree of degradation in forest areas especially the open forests demands more efficient management approach in forest protection that aims at improving the quality of the forests to make them more healthy and diverse. Forest undergrowth protection should evolve as a deliberate strategy to make forest more productive and beneficial for the dependant communities. Such an approach will also help forest to become more resilient and less vulnerable to impacts of climate change.
53. As noted women's knowledge on wild food plants is exemplary and it increases the habitat value by restoring wild vegetation. It is imperative to undertake studies on gendered knowledge and practices of wild food plants of the entire Ghat region for achieving the goal of sustainable management of biodiversity.
54. In order to curb the challenges and cease the emerging opportunities in the development of wild food plants, following specific steps may be undertaken
 - Document, describe and publish information on wild foods and wild relatives of all the major food crops to enable specialized research with reference to nutritional values and toxicity aspects. In such studies integration of expertise from disciplines like social anthropology, field botany and gender is necessary for deriving meaningful results. Immediately undertake an INTEGRATED STUDY OF WILD FRUITS, ROOTS & TUBERS AND LEGUMES of the Western Ghats;
 - Though wild food plants are consumed by elders, the younger generation by and large is reluctant to follow it and not aware of the nutritional value of prolonged consumption of native diet for their health. Therefore, it becomes imperative to

carry out extensive communication and education programmes amongst them on nutritional benefits of these plants and their potential capacity to function as emergency food. There is an urgent necessity of a wide NUTRITION LITERACY campaign amongst all sections of society.

- Field Germplasm Centres with collections of well described gene pool of the most preferred group of wild food plants, for example non-grain edible plants and seed legumes are necessary and should be promoted in every district or talukas along the Western Ghat region. With association of the Panchayath Raj Institutions and Forest departments such FIELD GENE BANKS should get promoted ;
- Market development is absolutely essential for introducing some of these species to the larger world. By involving private sector and local community youth efforts must be taken to study and develop an entire value chain of some of the promising plant species. Immediately initiate a project on MARKET FOR TOP 10 WILD FOOD PLANTS of Western Ghats. A list of 13 such species is given in Annexure II).
- INCREASE IN POLICY AWARENESS is an important action to be taken at national and PRI levels for the larger goal of protection, conservation and sustainable and equitable management of the wild food plants of this region.

We are hopeful that if the above steps are undertaken in a collective and methodical manner the Wild Food Plants of Western Ghats can be rediscovered and improved so that many of them may become global contributors to fight rural food and nutritional insecurity of the world.

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References:

1. Arora, R.K., and Pandey Anjula. 1996. *Wild Edible Plants of India: Diversity, Conservation and Use*. National Bureau of Plant Genetic Resources, New Delhi.
2. Balakrishnan, V., Ratheesh Narayanan, M. K., and Anil Kumar, N. 2003. Ethnotaxonomy of *Dioscorea* among the Kattunaikka people of Wayanad District, Kerala. *International Plant Genetic Newsletter*, Rome, 135.
3. Bell, J. 1995. *The hidden harvest*. In seedling, the quarterly newsletter of Genetic Resource Action International.
4. Falconer, J. 1990. Hungry season food from forests. *Unasylva*, 40 (160).
5. Fernold, M.L., and Kinsey, A.C. 1958. *Edible wild plants of eastern North America*. Harper and Brothers, New York.
6. Food and Agriculture Organisation. 1982. *Fruit bearing forest trees- technical notes*. FAO forestry paper 34, Rome.
7. Food and Agriculture Organisation. 1984. *Food and fruit bearing forest species 2: examples from south-eastern Asia*. Forestry paper 44/2. FAO, United Nations, Rome.
8. Food and Agriculture Organisation. 1989. *Forestry and nutrition – a reference manual*. FAO regional office, Bangkok.
9. Gammie, G.A. 1902. A note on plants used during famine and seasons of scarcity in Bombay Presidency. *Rec.Bot. Surv. India* 2(2).
10. Guinand, Y., and Dechassa, L. 2001. *Wild food plants in southern Ethiopia: reflections on the role of 'famine foods' at the time of drought*. UN-EUE survey, Addis Ababa.
11. Jain, S.K. 1964. *Wild plants foods of the tribals of Bastar (Madhya Pradesh)*. Proc. Nat. Inst. Sci. India. Part B, Biol.Sci. 30B.
12. Maheshwari, J.K., and Singh, J.P. 1986. Contribution to the ethnobotany of Bhoxa tribe of Bijnor and Pauri, Garhwal District, U.P. *J. Econ. Tax. Bot.* 5 (3).
13. Medsagar, O.P. 1957. *Edible wild plants*. Macmillan and Co., New York.
14. Negi, S.S. 1994. *India's forest, forestry and wildlife*. Indus publishing company, New Delhi.
15. Ratheesh Narayanan, M.K., Swapna, M.P., and Anil Kumar, N. 2003. *Gender dimensions of wild food management in Wayanad District*. MSSRF/RR/04/12.
16. Ratheesh Narayanan, M.K., and Anil Kumar, N. 2007. Gendered knowledge and changing trends in utilization of wild edible greens in Western Ghats, India. *Indian Journal of Traditional Knowledge*, 6 (1), 204-216.
17. Ratheesh Narayanan, M. K. 2009. Floristic study of Wayanad district with special emphasis on conservation of rare and threatened flowering plants. Ph.D. thesis, University of Calicut, Kerala, India.
18. Roy B, Halder, A.C., and Pal, D.C. 1998. *Plants for Human Consumption in India*. Botanical Survey of India, Calcutta.
19. Singh, R.S., and Singh, N.I. 1981. A preliminary ethnobotanical study on wild edible plants in the markets of Manipur. *J. Econ. Tax. Bot.* 6(2).

Annexure 1: LIST OF WILD FOOD PLANTS COLLECTED IN THE STUDY (Including Mushroom)

Group 1: EDIBLE ROOTS & TUBERS

Sl. No.	Scientific name	Family	Local name
1.	<i>Adenia hondala</i>	Passifloraceae	Koombikilangu
2.	<i>Aponogeton appendiculatus</i>	Aponogetonaceae	Chammikaya
3.	<i>Asparagus racemosus</i>	Liliaceae	Sathavarikilangu
4.	<i>Canna indica</i>	Cannaceae	Channakoova
5.	<i>Colocasia esculenta</i>	Araceae	Karinthalu
6.	<i>Colocasia esculenta</i>	Araceae	Vayal thalu
7.	<i>Colocasia esculenta</i>	Araceae	Karathalu
8.	<i>Colocasia esculenta</i>	Araceae	Karinchembu
9.	<i>Costus speciosus</i>	Zingiberaceae	Channakoova
10.	<i>Curcuama pseudomontana</i>	Zingiberaceae	Kattumanjal
11.	<i>Curcuma amada</i>	Zingiberaceae	Mangainchi
12.	<i>Curcuma zeodaria</i>	Zingiberaceae	Manjakoova
13.	<i>Cyperus rotundus</i>	Cyperaceae	Muthanga
14.	<i>D. pentaphylla</i> var. <i>communis</i>	Dioscoreaceae	Hendhikorana
15.	<i>D. pentaphylla</i> var. <i>linnaei</i>	Dioscoreaceae	Chenakorana
16.	<i>Dioscorea belophylla</i>	Dioscoreaceae	Hekku
17.	<i>Dioscorea hamiltonii</i>	Dioscoreaceae	Kaluvenni
18.	<i>Dioscorea hispida</i>	Dioscoreaceae	Kottunooru
19.	<i>Dioscorea intermedia</i>	Dioscoreaceae	Shoddikalasu
20.	<i>Dioscorea kalkapershadii</i>	Dioscoreaceae	Nara
21.	<i>Dioscorea oppositifolia</i>	Dioscoreaceae	Kavalakalasu
22.	<i>Dioscorea pentaphylla</i>	Dioscoreaceae	Noorakorana
23.	<i>Dioscorea pentaphylla</i> var. <i>Pentaphylla</i>	Dioscoreaceae	Noora
24.	<i>Dioscorea pentaphylla</i> var. <i>rheedii</i>	Dioscoreaceae	Korana
25.	<i>Dioscorea pubera</i>	Dioscoreaceae	Boojikavala
26.	<i>Dioscorea</i> sp.	Dioscoreaceae	Moodavenni
27.	<i>Dioscorea</i> sp.	Dioscoreaceae	Hekkuheruman
28.	<i>Dioscorea</i> sp.	Dioscoreaceae	Heruman
29.	<i>Dioscorea</i> sp.	Dioscoreaceae	Erekalasu
30.	<i>Dioscorea tomentosa</i>	Dioscoreaceae	Salu
31.	<i>Dioscorea wallichii</i>	Dioscoreaceae	Narra
32.	<i>Dioscorea wightii</i> .	Dioscoreaceae	Narramooyan
33.	<i>Ipomoea mauritiana</i>	Convolvulaceae	Muthukku
34.	<i>Maranta arundinacea</i>	Marantaceae	Koova
35.	<i>Pecteilis gigantea</i>	Orchidaceae	Kudukilangu
36.	<i>Zingiber neesenum</i>	Zingiberaceae	Kattukolinchu
37.	<i>Zingiber wightianum</i>	Zingiberaceae	Malayinchu
38.	<i>Zingiber zerumbet</i>	Zingiberaceae	Katinchi

Group 2: EDIBLE LEAFY GREENS/VEGETABLES

Sl. No.	Scientific name	Part used	Local names used by:		
			Paniya	Kattunaikka	Kuruma
1	<i>Abelmoschus angulosus</i>	F	Kattuvenda	-	Kattuvenda
2	<i>Abrus precatorius</i>	F	Kunni	-	-
3	<i>Achyranthes aspera</i>	L	Valiyakadaladi	-	-
4	<i>Achyranthes bidentata</i>	L	Kozhivalan	-	-
5	<i>Adenia hondala</i>	Fl	Koombichapu	-	-
6	<i>Allmania nodiflora</i>	L	-	Hallukeerai	-
7	<i>Alternanthera bettzickiana</i>	L	Cherucheera	-	-
8	<i>Alternanthera brasiliiana</i>	L	Choracheera	Chorakkerai	Choracheera
9	<i>Alternanthera pungens</i>	L	Minnamkkanni	-	-
10	<i>Alternanthera sessilis</i>	L	Ponnamkkanni	Honkalasoppu	Ponamkanni
11	<i>Amaranthus caudatus</i>	L	Kattucheera	-	-
12	<i>Amaranthus spinosus</i>	W	Mullancheera	Mullankkeerai	Mullancheera
13	<i>Amaranthus viridis</i>	W	Kuppacheera	Valakkeerai	Kuppacheera
14	<i>Antidesma acidum</i>	L	Noolithali	-	-
15	<i>Arenga wightii</i>	TL	Netipankumpu	-	-
16	<i>Bacopa monnieri</i>	W	Brahmichappu	-	-
17	<i>Bambusa bambos</i>	TL	Kayalkkalli	Kattaekalli	Mulankumpu
18	<i>Basala alba</i>	W	Vasalachapu	-	Vasala
19	<i>Bauhinia purpurea</i>	L	Katumandaram	-	-
20	<i>Begonia malabarica</i>	L	Malampuli	-	-
21	<i>Begonia floccifera</i>	L	Malampuli	-	-
22	<i>Bidens biternata</i>	L	Alanchappu	Uthransoppu	-
23	<i>Blumea barbata</i>	TL	-	Kadukucheera	-
24	<i>Boerhaavia diffusa</i>	W	Thazhuthama	-	Thazhuthama
25	<i>Bombax ceiba</i>	TL	Poola	-	-
26	<i>Canavalia cathartica</i>	F	Kattupayar	-	-
27	<i>Capparis brevispina</i>	L	-	Maradasoppu	-
28	<i>Capsicum frutescens</i>	TL	Cheenaparangi	Koorimanasu	Kanthary
29	<i>Caryota urens</i>	TL	Panamchapu	Panasoppu	-
30	<i>Cassia occidentalis</i>	TL	Poninthavara	-	-
31	<i>Cassia tora</i>	TL	Thavara	Thakattasoppu	Thakara
32	<i>Catunaregam spinosa</i>	TL	Kara	-	-
33	<i>Catunaregam uliginosa</i>	F	-	Hinnisan kaya	-
34	<i>Centella asiatica</i>	L	Muthilila	Muthilsopu	Muthil
35	<i>Ceropegia metziana</i>	L	-	Palankeera	-
36	<i>Chenopodium album</i>	L	-	Parippukkera	-
37	<i>Cissus discolor</i>	W	Vallimaruma	Thadavasopu	-
38	<i>Cleome viscosa</i>	L	Naikkadugu	-	-
39	<i>Colocasia esculenta</i>	TL;P;F	Kollithalu	Henchichebu	Thalu
40	<i>Commelina benghalensis</i>	L	-	Kannisoppu	-

41	<i>Costus speciosus</i>	R	Unnithandu	-	-
42	<i>Crotalaria laevigata</i>		-	Koovilisoppu	-
43	<i>Cryptocoryne retrospiralis</i>	W	Panchithalu	-	-
44	<i>Cucumis porphetarum</i>	TF	Attanga	-	-
45	<i>Cyathula prostrata</i>		Cherukadaladi	-	-
46	<i>Dillenia indica</i>	TL	Malampunna	-	-
47	<i>Diplazium esculentum</i>	W	Churuli	Surulisoppu	Churuli
48	<i>Diplocyclos palmatus</i>	F	Kuniyanchappu	Uvakandasoppu	-
49	<i>Dryopteris cucullata</i>	W	Parachava	-	-
50	<i>Embelia tsjeriam- cottam</i>	L	-	Marakkeera	-
51	<i>Emilia sonchifolia</i>	L	Muyalcheviyan	Muyalkivi	-
52	<i>Erythrina stricta</i>	L	Murikkinchapu	Murikkusoppu	-
53	<i>Euphorbia hirta</i>	L	Palcheera	-	-
54	<i>Gmelina arborea</i>	Fl	Kumbil	-	-
55	<i>Hibiscus hispidissimus</i>	L	Paruthiyila	-	Pulichapu
56	<i>Hygrophila schulli</i>	L	Kozhimullan	-	-
57	<i>Justicia nilgherrensis</i>	L	-	Hattakkerai	-
58	<i>Laportea interrupta</i>	L	Choriyanam	-	Choriyan
59	<i>Leea indica</i>	TL	-	Idavasoppu	-
60	<i>Lycianthes laevis</i>	L	Kattumudunga	-	-
61	<i>Marselia quadrifolia</i>	W	Vattachappu	-	-
62	<i>Momordica dioica</i>	F	Kattukaippa	-	Kaipa
63	<i>Momordica subangulata</i>	F	Kattupaval	Kattuhakhila	Katukaipa
64	<i>Monochoria vaginalis</i>	L	Karinkoovalam	-	-
65	<i>Mucuna monosperma</i>	F	Kattupayar	-	Payaru
66	<i>Mukia maderaspatana</i>	F	Mukkapeera	-	-
67	<i>Nymphaea nouchali</i>	R	Ambal	-	-
68	<i>Ophioglossum reticulatum</i>	W	Nakkuneeti	-	-
69	<i>Oxalis corniculata</i>	L	Puliyarila	Pulielai	Puliyela
70	<i>Passiflora calcarata</i>	TF	Kattuthakkali	-	-
71	<i>Phoenix sylvestris</i>	TL	Kattueenthu	-	-
72	<i>Phyllanthus urinaria</i>	L	-	Keezharnelli	-
73	<i>Physalis minima</i>	F	Motampuli	-	-
74	<i>Persicaria chinensis</i>	TL	Chorakam	-	-
75	<i>Persicaria glabra</i>	TL	Pulichapu	-	-
76	<i>Portulaca oleracea</i>	L	Kozhupacheera	Kozhupasoppu	Kozhupa
77	<i>Pteridium aquilinum</i>	W	-	Thaivasoppu	Churuli
78	<i>Remusatia vivipara</i>	L	Marachembu	Marachembu	-
79	<i>Solanum nigrum</i>	F	Mudungachapu	Ganagasopu	Mudunga
80	<i>Sonerila rheedei</i>	W	Kundimaruma	-	-
81	<i>Talinum cuneifolium</i>	L	Sambarcheera	-	-
82	<i>Thespesia populnea</i>	L	Poovarasu	-	-
83	<i>Waltheria indica</i>	W	Maracheera	-	-

F: Fruit; Fl: Flower; L: Leaves; P: Petiole; R: Rhizome; TF: Tender fruits; TL: Tender leaves; W: Whole plant

Group 3: EDIBLE FRUITS & SEEDS

Sl. No.	Scientific name	Part used	Local name	Family
1.	<i>Aegle marmelos</i>	F	Koovalam	Rutaceae
2.	<i>Aponogeton appendiculatus</i>	S	Chammikkaya	Aponogetonaceae
3.	<i>Aporosa lindleyana</i>	F	Eachil	Euphorbiaceae
4.	<i>Artocarpus heterophyllus</i>	F & S	Kattuchakka	Myrtaceae
5.	<i>Artocarpus hirsutus</i>	F & S	Ayanichakka	Moraceae
6.	<i>Baccaurea courtallensis</i>	F	Mottilthoory	Euphorbiaceae
7.	<i>Bambusa bambos</i>	S	Mulayari	Poaceae
8.	<i>Bischofia javanica</i>	F	Neelipazham	Euphorbiaceae
9.	<i>Bridelia retusa</i>	F	Mukayani	Euphorbiaceae
10.	<i>Bridelia scandens</i>	F	Nendravalley	Euphorbiaceae
11.	<i>Buchanania lanzan</i>	S	Murickil	Anacardiaceae
12.	<i>Clausena heptaphylla</i>	F	Kattukariveppu	Rutaceae
13.	<i>Coix lacryma-jobi</i>	S	Kattubarli	Poaceae
14.	<i>Cycas circinalis</i>	F	Eenthukaya	Cycadaceae
15.	<i>Diospyros melanoxylon</i>	F	Deprahannu	Ebenaceae
16.	<i>Elaeocarpus munronii</i>	F & S	Kottilampazham	Elaeocarpaceae
17.	<i>Ficus racemosa</i>	F	Athypazham	Moraceae
18.	<i>Flacourtia montana</i>	F	Chalir	Flacourtiaceae
19.	<i>Garcinia gummi-gutta</i>	F	Kattukodampuli	Clusiaceae
20.	<i>Glycosmis pentaphylla</i>	F	Panlpazham	Rutaceae
21.	<i>Gnetum ula</i>	S	Njenumkaya	Gnetaceae
22.	<i>Grewia hirsuta</i>	F	Hallaekaya	Tiliaceae
23.	<i>Grewia tiliifolia</i>	F	Chadachikkaya	Tiliaceae
24.	<i>Ixora coccinia</i>	F	Chekkipazham	Rubiaceae
25.	<i>Lantana camara</i>	F	Kongini	Lamiaceae
26.	<i>Leea indica</i>	F	Edavahannu	Leeaceae
27.	<i>Madhuca longifolia</i>	S	Hippehannu	Sapotaceae
28.	<i>Mangifera indica</i>	F	Kattumanga	Anacardiaceae
29.	<i>Melastoma malabathricum</i>	F	Pillandi	Melastomataceae
30.	<i>Mimusops elengi</i>	F & S	Elanchipazham	Mimosaceae
31.	<i>Myristica malabarica</i>	F	Kattujadikka	Myristicaceae
32.	<i>Palaquium ellipticum</i>	F	Palakkai	Sapotaceae
33.	<i>Passiflora calcarata</i>	F	Kattuthakkali	Passifloraceae
34.	<i>Passiflora foetida</i>	F	Poodapazham	Passifloraceae
35.	<i>Phyllanthus emblica</i>	F	Nelli	Euphorbiaceae
36.	<i>Physalis minima</i>	F & S	Motampuli	Solanaceae
37.	<i>Physalis mouritiana</i>	F	Njotanjodian	Solanaceae
38.	<i>Rubus fulvous</i>	F	Kattumundhiri	Rosaceae
39.	<i>Schleichera oleosa</i>	F	Chakadahannu	Sapindaceae

40.	<i>Scleropyrum pentandrum</i>	F	Kirinda	Santalaceae
41.	<i>Semecarpus anacardium</i>	S	Geruhannu	Anacardiaceae
42.	<i>Solanum ferox</i>	F &S	Kurukkanchunda	Solanaceae
43.	<i>Solanum nigrum</i>	F &S	Mudungakaya	Solanaceae
44.	<i>Solanum torvum</i>	F & S	Putharichunda	Solanaceae
45.	<i>Solanum xanthocarpum</i>	F &S	Kandakarichunda	Solanaceae
46.	<i>Solena amplexicaulis</i>	F &S	Karuvachakka	Cucurbitaceae
47.	<i>Spondias indica</i>	F	Kattambazham	Anacardiaceae
48.	<i>Sterculia foetida</i>	S	Kalanthatta	Sterculiaceae
49.	<i>Syzygium caryophyllatum</i>	F	Njarapazham	Myrtaceae
50.	<i>Syzygium cumini</i>	F	Njarapazham	Myrtaceae
51.	<i>Syzygium densiflorum</i>	F	Arinjaval	Myrtaceae
52.	<i>Syzygium gardneri</i>	F	Karinjavel	Myrtaceae
53.	<i>Syzygium hemisphericum</i>	F	Tholnjal	Myrtaceae
54.	<i>Syzygium laetum</i>	F	attunjaval	Myrtaceae
55.	<i>Syzygium mundagam</i>	F	Undanjaval	Myrtaceae
56.	<i>Syzygium zeylanicum</i>	F	Poochapazham	Myrtaceae
57.	<i>Tamilnadia uliginosa</i>	F	Pindichakka	Rubiaceae
58.	<i>Terminalia bellirica</i>	S	Thanikkuru	Combretaceae
59.	<i>Toddalia asiatica</i>	F	Mulluvalli	Rutaceae
60.	<i>Ziziphus jujuba</i>	F	Kottamullu	Rhamnaceae
61.	<i>Ziziphus oenoplia</i>	F	Kottapazham	Rhamnaceae
62.	<i>Ziziphus rugosa</i>	F	Thodali	Rhamnaceae

F: Fruit; K: Kattunaikka; Ku: Kuruma; P: Paniya; S: Seed

Group 4: EDIBLE MUSHROOMS

1	<i>Agaricus compestris</i> L.	Valanavae	Agaricaceae
2	<i>Cantharellus cibarius</i> Fr.	Mayilanavae	Cantharellaceae
3	<i>Clitocybe hypocalamus</i> van Overeen	Venjagilanavae	Hydnangiaceae
4	<i>Clitocybe laccata</i> Scop	Njeralanavae	Hydnangiaceae
5	<i>Collybia albuminosa</i> (Berk.) Petch Syn.	Kaikananavae	Tricholomataceae
6	<i>Collybia microcarpa</i> Hohnel	Therikaanavae	Tricholomataceae
7	<i>Coprinus comatus</i> (Fr.) S. F. Gray	Karanavae	Coprinaceae
8	<i>Coprinus niveus</i> Fr.	Komananavae	Coprinaceae
9	<i>Craterellus cornucopioides</i> (L.) Pers.	Jalanavae	Cantharellaceae
10	<i>Entoloma microcarpum</i> Berk . & Br.	Thorathalanavae	Entolomataceae
11	<i>Lactarius deliciosus</i> S.F. Gray	Chorakalanavae	Russulaceae
12	<i>Lactarius sajorcaju</i> Fr	Katanavae	Russulaceae
13	<i>Lactariun subnudus</i> Berk.	Chullianavae	Russulaceae
14	<i>Lepiota cepaestipes</i> Sowerby	Mookanavae	Agaricaceae

15	<i>Lepiota mastoidea</i> Fr.	Vendanavae	Agaricaceae
16	<i>Pleurotus cretaceus</i> Massee	Aamlekuman	Pleurotaceae
17	<i>Schizophyllum commune</i> Fr.	Marakkulathikuman	Schizophyllaceae
18	<i>Termitomyces heimii</i> Natarajan	Vellanavae	Pluteaceae
19	<i>Termitomyces microcarpus</i> f. <i>elongates</i> R.Heim.	Kolananavae	Pluteaceae
20	<i>Clarkeinda trachodes</i> (Berk.) Sing.	Kayalkandakkuman	Agaricaceae
21	<i>Oudemansiella canarii</i> (Jungh.) Hohn. <i>Phlebopus portentosus</i> (Petch) Heinemman &	Mankumman	Marasmiaceae
22	Rammeloo	Karadianavae	Boletinellaceae
23	<i>Auricularia auricula</i> (L. ex Hook.) Underw.	Kattukkumman	Auriculariaceae
24	<i>Schizophyllum commune</i> Fr.	Kolathikkumman	Schizophyllaceae
25	<i>Termitomyces clypeatus</i> R. heim	Ambukkumman	Pluteaceae
26	<i>Lepista sordida</i> (Fr.) Sing	Cheerukkumman	Tricholomataceae
27	<i>Termitomyces microcarpus</i> (Berk. & Broome) R. Heim.	Nedumthalikoou	Pluteaceae
28	<i>Cantharellus cibarius</i> Fr.	Arsnakalanavae	Cantharellaceae
29	<i>Termitomyces</i> Sp.	Naymula anavae	Pluteaceae
30	<i>Lentinus</i> Sp.	Marakkuttikuman	Polyporaceae
31	<i>Termitomyces</i> Sp.	Puttukumman	Pluteaceae
32	<i>Russula</i> Sp.	Vellasalanavae	Russulaceae
33	<i>Termitomyces</i> Sp.	Nettanavae	Pluteaceae
34	<i>Macrolepiota</i> Sp.	Huppuhurianavae	Agaricaceae
35	<i>Polyporus</i> Sp.	Kavalanavae	Polyporaceae
36	<i>Agaricus</i> sp.	Pillikuthananavae	Agaricaceae
37	<i>Lycoperdon</i> Sp.	Undakumman	Agaricaceae
38	<i>Trycholoma</i> Sp.	Kothananavae	Tricholomataceae
39	<i>Pleurotus</i> Sp.	Amlukumman	Pleurotaceae
40		Anadiayan anavae	

Annexure II Commercially potential species of wild food plants from Wayanad district

Category	Scientific name	Family	Common name
Roots & Tubers	<i>Curcuma amada</i>	Zingiberaceae	Mangainchi
	<i>Canna indica</i>		
	<i>Maranta arundinacea</i>	Dioscoreaceae	Kavalakalasu

	<i>Dioscorea pentaphylla var. linnaei</i>	Dioscoreaceae	Chenakorana
Leafy Greens	<i>Crotalaria laevigata</i>	Fabaceae	Koovilisoppu
	<i>Diplazium esculentum</i>	Diplaziaceae	Churuli
	<i>Amaranthus viridis</i>	Amaranathaceae	Maracheera
Fruits	<i>Catunaregam uliginosa</i>	Rubiaceae	Pindichakka
	<i>Syzygium cumini</i>		
	<i>Flacourtia montana</i>	Flacourtiaceae	Chalir
	<i>Garcinia gummi-gutta</i>	Clusiaceae	Kattukodampuli
Mushrooms	<i>Termitomyces Sp.</i>	Puttukumman	Pluteaceae
	<i>Termitomyces clypeatus R. heim</i>	Ambukkumman	Pluteaceae