
Bioresources for Food and Nutrition Security: The Case of Wild Edibles of Western Ghats

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Abstract

Wild edibles (foods) are plant and animal resources outside the agricultural areas that are harvested for the purpose of human consumption. This chapter provides the diversity and trends in the use and management of wild edible species with reference to different sociocultural groups from the Wayanad District, in Kerala, part of the Western Ghats. Three hundred fifty-three species of seven major groups of wild foods that include leafy greens, tubers and roots, fruits and seeds, mushrooms, honey, crabs and fishes are discussed. The places where the wild edibles proliferate, the communities that come in search of these edibles, the colloquial terms that are commonly used to describe them and the gender roles that come into play during harvesting and processing of the wild foods have also been traced out. Tribal and rural families of the region continue to collect and conserve a wide range of plants to meet their diverse food needs, and women are more skilful in managing the surrounding landscape and are the chief knowledge holders and conservationists. It is also noted that the wild edibles have a critical role to play in dealing with the issue of undernutrition, and hence dynamic conservation of agrobiodiversity needs to be placed high in the national development agenda for leveraging nutrition in agriculture and alleviating poverty and malnutrition.

Keywords

Wild edibles • Wayanad • Western Ghats • Gender • Agrobiodiversity

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4.1 Introduction

There are at least 3000 edible plant species known to mankind, but just about 30 crops alone contribute to more than 90% of the world's calorie intake, and only 120 crops are economically important at the national scale (FAO 1993). This shows that several hundreds of species remain discarded or unnoticed at the hands of various human societies. A wide variety of cultivated plants used by mankind today have been derived from such wild related crop plants (Swaminathan and Jana 1992). Among these, many are nutritionally or otherwise important. Reid and Miller (1989) have given the example of quinoa (*Chenopodium quinoa*), a staple grain of Incas. It is a little-known crop to the modern world, yet is one of the world's most productive sources of protein. There are plant and animal resources outside of agricultural areas that are harvested or collected for the purpose of human consumption. These are incorporated into the normal livelihood strategies of many rural people, be they pastoralists, shifting cultivators, continuous croppers or hunter-gatherers. They are usually considered as an additional diet to rural and forest dwelling people's daily food consumption pattern and are usually described as 'wild foods' (Bell 1995). Wild plants and animals have provided an important source of food since time immemorial (Gammie 1902; Fernold and Kinsey 1958; Medsager 1957; Bell 1995). Various wild species of *Dioscorea*, taros and *Amaranthus*, which are the source of vitamins and nutrients, supplement the food needs of a multitude of families who live near forests (Roy et al. 1998). Many studies have revealed the role of wild food – the 'forest food' – particularly during stress seasons in the household food security and importantly the nutritional security of poor tribal and rural families (Singh and Singh 1981, FAO 1982, 1984, 1989; Falconer 1990). Animal food from forest and wild trees contributes a significant portion to the wild food consumed by the forest-dependent communities (Falconer and Arnold 1991). There are a number of studies from Northeast Thailand analysing the wild food plant diversity of rice fields which serves the utilities of food, medicines, timber, latex, oil and fodder. Most of these wild food plants are found in paddy fields compared to secondary woody areas and home gardens (Grandstaff et al. 1986; Watanabe et al. 1990; Price 1997; Prachaiyo 2000; Manechote 2007, Cruz-Garcia and Price 2011).

Authors have differently classified and grouped the wild edibles (wild foods). The grouping followed was based on either (1) the parts of the plant consumed or (2) the type of resources. Those groupings ran as tubers and roots, leafy vegetables and greens, buds and flowers, fruits, seeds and nuts, typical famine food plants, wild food plants with famine food components, wild food plants attracting additional consumer categories during food shortage periods, on-farm food crops with famine food components, food eaten only in an emergency, wild plants gathered by people living in and around forests, food gathered from the forest by the local people and also available for sale in rural and semiurban market, cultivated edible forest species available for sale, etc. (Negi 1994; Arora and Pandey 1996; Guinand and Dechassa 2001; Kanvinde et al. 2001).

Arora and Pandey (1996) have reported 1532 wild food species as edible from India, mostly from the Western Ghats and Himalayan regions. A wild food also

contributes to the household income security of millions of forest-dependent communities. In India, those who collect species such as gooseberry, *Garcinia*, *Parmelia* and honey for market are mostly dependent on it as their major source of income (Muralidharan et al. 1997). The wild foods used by various tribes in India also have received considerable attention (Jain 1964; Maheshwari and Singh 1986; Narayanan et al. 2004). But it was studied that the integrity of wild genetic resources is threatened by a number of human activities (McNeely et al. 1990). These include deforestation and changes in land use, inappropriate forest harvesting techniques, pollution and climate change and the often uncontrolled and undocumented movement of forest germplasm for plantation establishment, leading to the loss of locally adapted populations (WRI et al. 1992). Still the striking wild biodiversity that survives despite the calamitous human interventions lends unparalleled uniqueness to the Indian subcontinent and especially in the Western Ghats. This chapter gives an account of the wild foods recorded from Wayanad District in Kerala, part of the Western Ghats.

Wayanad: An Agrobiodiversity and Sociocultural Hotspot in the Western Ghats Wayanad is a hilly terrain in southern Western Ghats and lies at an average altitude of 750 m above sea level (Fig. 4.1). The district of 2136 km² is unique for its rich wealth of flora and fauna and for the diverse cultures that inhabit the land. Wayanad is a high-range agro-ecological zone having moderately distributed monsoons (Kerala Agricultural University 2011). Narrow valleys surrounded by low-range undulating hills and steep slopes characterise typical paddy fields in Wayanad. The total geographic area is 212,966 ha with a total cropped area of 174,190 ha (Department of Economics and Statistics 2015). The contribution to the state's foreign exchange earnings through cash crops (pepper, cardamom, coffee, tea, ginger, turmeric, rubber and areca nut) is significant (Kumar et al. 2010). Floristic exploration of the district has recorded nearly 49% of the flora of the Kerala state and more than 10% of the flora of India. This study has reported a total of 596 endemic taxa in which 15 are exclusive to the district (Narayanan 2009). According to Nair (1911), *Wayanad* means upper land or from *Vayalnadu* meaning land (*nadu*) of paddy fields (*vayal*) or from *Vananadu* meaning land of forests (*Vanam*).

Wayanad is notable for its large tribal population, which accounts for 18.53% and is the largest among the districts in the state (Office of the Registrar General and Census Commissioner 2011). They can be broadly classified into farming communities (Kurichya, Mullukuruma), agricultural labourers (Paniya, Adiya), artisan communities (Uralikuruma) and hunter-gatherer communities (Kattunaikka). Others are Thachanadan Moopan, Karimbalar, Pathiya and Wayanadan Kadar. These are the communities who still hold knowledge on biodiversity and follow traditional conservation practices. The Paniya constitutes the single largest Scheduled Tribe in Kerala and mainly lives in the Wayanad District and the neighbouring areas of Karnataka State. They have a distinct language of their own, closely related to Malayalam. The Paniya was brought to Wayanad by the Gounders who trained them to be agricultural labourers in their fields. The Kattunaikka is referred to variously as 'Jenu Kuruman', 'Tenu Kurumban' and 'Naickan'. The term

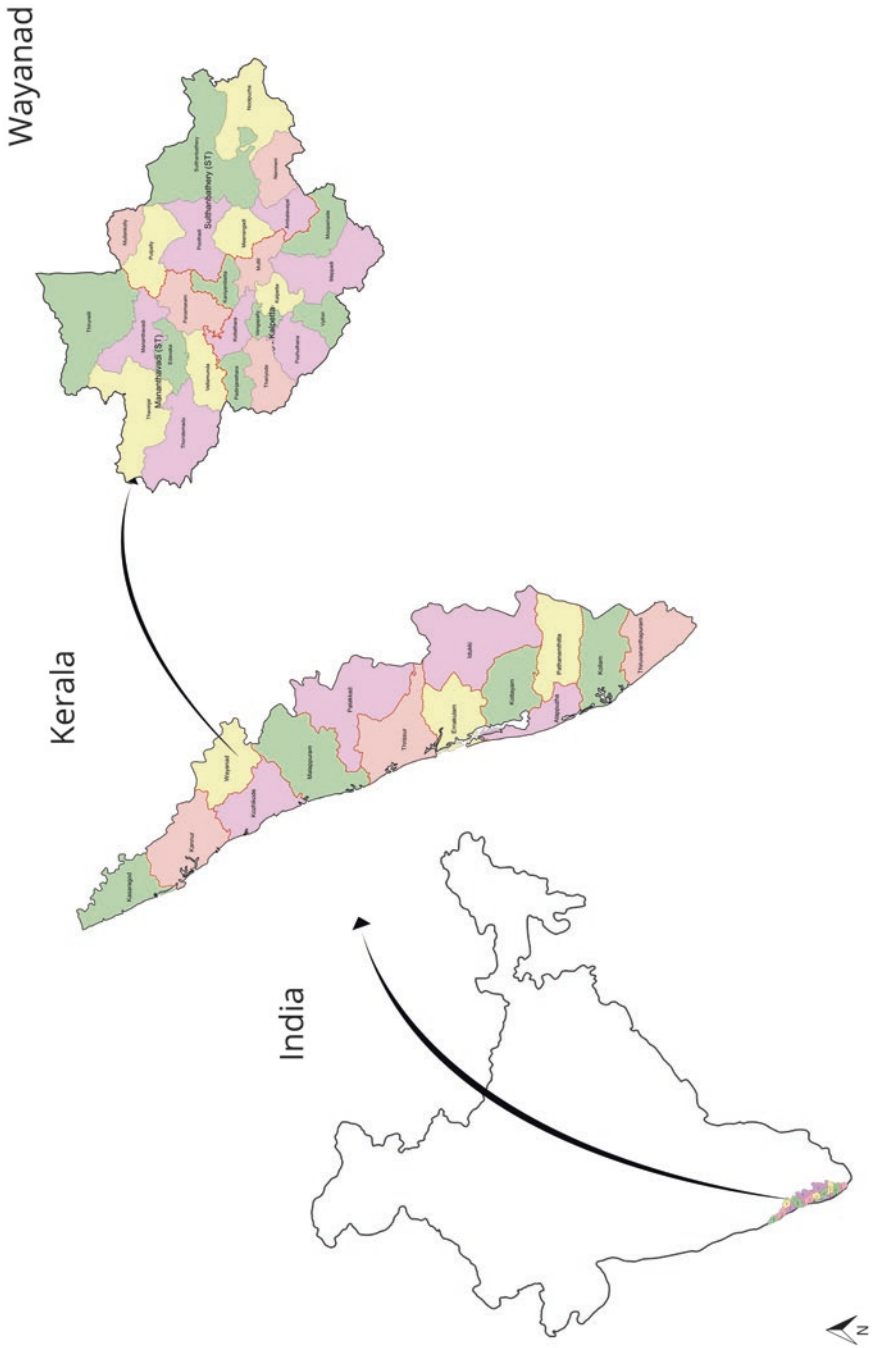


Fig. 4.1 Location of Wayanad (From MSSRF archive)

Kattunaikkan has been derived from the word ‘Kadu’, meaning forest, and ‘Naikkan’, meaning leader or headman. The community is predominantly distributed in Wayanad District. The Mullukuruma, often referred to as just Kuruma, is a Scheduled Tribe found in Wayanad and also has the largest settler population in Kerala. No religion is predominant in the district; the major religious groups of the state are all more or less equally represented. Christians who are the single largest religious group constitute one fourth of the population. They are primarily settlers who emigrated from Travancore area of south Kerala. Muslims who constitute another near one fourth of the population are the ‘Mapilas’ who have come from Malappuram and Kozhikode districts. Hindus of different castes, like Nairs, Thiyyas, Wayanadan Chetty, etc. who settled here from different parts of Kerala, form the rest of the population. A small representation by way of the Gounders who came from Karnataka constitutes the Jain community of Wayanad, many of whom are planters with sizeable holdings (Luiz 1962; Thurston 1909; Nair 1911; Janah 1994; Indian Institute of Management 2006).

4.2 Wild Edibles of Wayanad

Leafy Greens Wild leaves are among the most widely consumed wild foods. Most of the leafy wild food plants are locally referred to and classified as ‘weeds’, sprouting and flourishing after rains. Women use them in soups, stews and relishes that add flavour to staples. While some leaves are high in fats, others are high in protein, and most are good source of vitamins and minerals. Ninety-four wild edible greens have been reported, but only a few species are widely used (Tables 4.1 and 4.2). The household survey conducted has revealed that the Paniya families consume about 83 species followed by the Kattunaikka families who consume 43 species, the Kuruma

Table 4.1 Most frequently used leafy greens in Wayanad

No.	Local name(s)	Botanical name
1	Ponnamkanni/Minugalasoppu	<i>Alternanthera sessilis</i> R. Br.
2	Mudungachapu/Kattuthakkali/Chukkootti	<i>Solanum nigrum</i> L.
3	Churuli	<i>Diplazium esculentum</i> (Retz.) Sw.
4	Mullancheera/Mullukeera/Mullancheera/ Chuvappu Cheera	<i>Amaranthus spinosus</i> L.
5	Kalicheera/Kuppakeera/Vazhacheera	<i>Amaranthus viridis</i> var.
6	Karinthal/ Kollithal	<i>Colocasia esculenta</i> (L.) Schott
7	Marakeera	<i>Embelia tsjeriam-cottam</i> A.DC.
8	Vasalacheera	<i>Basella alba</i> L.

Narayanan et al. (2004)

Table 4.2 Leafy greens of Wayanad

Sl no.	Local name	Botanical name	Knowledgeable sociocultural group ^a
1	Alanchappu	<i>Bidens biternata</i> (Lour.) Merr.	P, Ku, K, O
2	Aliyanchappu	<i>Zehneria maysorensis</i> (Wt. and Arn.) Am.	P, Ku, K
3	Ambal	<i>Nymphaea nouchali</i> Burm. f.	P, Ku, K
4	Attanga	<i>Cucumis prophetarum</i> L.	P, Ku, K
5	Ayanichakka	<i>Artocarpus hirsutus</i> Lamk.	P, Ku, K, O
6	Brahmichappu	<i>Bacopa monnieri</i> (L.) Pennell	P, Ku, K
7	Chakka	<i>Artocarpus heterophyllus</i> Lamk.	P, Ku, K, O
8	Cheenaparangi	<i>Capsicum annum</i> L.	P, Ku, K, O
9	Cherukadaladi	<i>Cyathula prostrata</i> (L.) Bl.	P, Ku, K, O
10	Cherucheera	<i>Alternanthera bettzickiana</i> Br.	P, Ku, K, O
11	Cherukadaladi	<i>Cyathula prostrata</i> L.	P, Ku, K, O
12	Chooral	<i>Dendrocalamus strictus</i> (Roxb.) Nees	P, Ku, K
13	Choracheera	<i>Alternanthera dentate</i> Br.	P, K, O
14	Chorakam	<i>Polygonum chinense</i> L.	P, Ku, K
15	Choriyanam	<i>Laportea interrupta</i> (L.) Chew.	P, Ku, K, O
16	Chorkam	<i>Polygonum glabrum</i> L.	P, Ku, K
17	Churuli	<i>Diplazium esculentum</i> (Retz.) Sw.	P, Ku, K, O
18	Eenthukumpu	<i>Cycas circinalis</i> L.	P, Ku, K, O
19	Hattakkeerai	<i>Justicia nilgherrensis</i> (Nees) T. Anders	P, Ku, K
20	Hinnisan kaya	<i>Tamilnadia uliginosa</i> (Retz.) Tirveng	P, Ku, K
21	Kadambu	<i>Barringtonia racemosa</i> Bl.	P, Ku, K
22	Kadukucheera	<i>Blumea barbata</i> DC.	P, Ku, K, O
23	Kaida	<i>Pandanus fascicularis</i> Lamk.	P, Ku, K
24	Kalicheera	<i>Amaranthus viridis</i> var.	P, Ku, O
25	Kannisoppu	<i>Commelina benghalensis</i> L.	P, Ku, K
26	Kara	<i>Catunaregam spinosa</i> (Thunb.) Tir.	P, Ku, K
27	Karimthalu	<i>Colocasia esculenta</i> (L.) Schott	P, Ku, K, O
28	Karinkoovalam	<i>Monochoria vaginalis</i> Presl.	P, Ku, K
29	Kattucheera	<i>Amaranthus caudatus</i> L.	P, Ku, K, O
30	Kattueenthu	<i>Phoenix sylvestris</i> Roxb.	P, Ku, K
31	Kattukaipaka	<i>Momordica dioica</i> Roxb.	P, Ku, K, O
32	Kattumandaram	<i>Bauhinia purpurea</i> L.	P, Ku, K
33	Kattumudunga	<i>Lycianthes laevis</i> (Dunal) Bitter	P, Ku, K
34	Kattupaval	<i>Momordica subangulata</i> Bl.	P, Ku, K
35	Kattupayar	<i>Canavalia cathartica</i> Thouars.	P, Ku, K
36	Kattupayar	<i>Mucuna monosperma</i> DC.	P, Ku, K
37	Kattuthakkali	<i>Passiflora calcarata</i> Mast.	P, Ku, K, O
38	Kattuvenda	<i>Abelmoschus angulosus</i> Wall.	P, Ku, K, O
39	Kayalkkali	<i>Bambusa arundinacea</i> Willd.	P, Ku, K, O

(continued)

Table 4.2 (continued)

Sl no.	Local name	Botanical name	Knowledgeable sociocultural group ^a
40	Keezharnelli	<i>Phyllanthus niruri</i> L.	P, Ku, K, O
41	Kollithalu	<i>Colocasia esculenta</i> (L.) Schott	P, Ku, K, O
42	Koombichapu	<i>Adenia hondala</i> (Gaertn.) de Wilde	P, Ku, K
43	Koovilisoppu	<i>Crotalaria laevigata</i> Lam.	P, Ku, K
44	Kozhimullan	<i>Hygrophila schulli</i> Ham.	P, Ku, K, O
45	Kozhivalan	<i>Achyranthes bidentata</i> Bl.	P, Ku, K
46	Kozhuppa cheera	<i>Portulaca oleracea</i> L.	P, Ku, K
47	Kumbil	<i>Gmelina arborea</i> Roxb.	P, Ku, K
48	Kundimaruma	<i>Sonerila rheedii</i> Wt.	P, Ku, K
49	Kuniyanchappu	<i>Diplocyclos palmatus</i> (L.) Jeffrey	P, Ku, K
50	Kunni	<i>Abrus precatorius</i> L.	P, Ku, K
51	Kuppacheera	<i>Amaranthus viridis</i> L.	P, Ku, K, O
52	Malampuli	<i>Begonia malabarica</i> Lamk.	P, Ku, K, O
53	Malampuli	<i>Begonia integrifolia</i> Dalz.	P, Ku, K
54	Malampunna	<i>Dillenia indica</i> L.	P, Ku, K
55	Malanchuruli	<i>Dryopteris cochleata</i>	P, Ku, K
56	Maracheera	<i>Waltheria indica</i> L.	P, Ku, K
57	Marachembu	<i>Remusatia vivipara</i> Schott.	P, Ku, K
58	Maradasoppu	<i>Capparis</i> sp.	P, Ku, K
59	Marakkeera	<i>Embelia tsjeriam-cottam</i> A.DC.	P, Ku, K
60	Minnamkkanthi	<i>Alternanthera pungens</i> Kunth.	P, Ku, K
61	Motampuli	<i>Physalis minima</i> L.	P, Ku, K
62	Mudungachappu	<i>Solanum nigrum</i> L.	P, Ku, K, O
63	Mukkapeera	<i>Mukia maderaspatana</i> (L.) M. Roem.	P, Ku, K
64	Mullancheera	<i>Amaranthus spinosus</i> L.	P, Ku, K, O
65	Mullancheera	<i>Chuvappu Amaranthus spinosus</i> L.	P, Ku, K, O
66	Murikinchappu	<i>Erythrina stricta</i> Roxb.	P, Ku, K, O
67	Muthilila	<i>Centella asiatica</i> (L.) Urban	P, Ku, K, O
68	Muyalcheviyan	<i>Emilia sonchifolia</i> (L.) DC.	P, Ku, K
69	Naikkadugu	<i>Cleome viscosa</i> L.	P, Ku, K
70	Nakkuneeti	<i>Ophioglossum reticulatum</i> L.	P, Ku, K
71	Njetipanakumpu	<i>Arenga wightii</i> Griff.	P, Ku, K
72	Noolithali	<i>Antidesma acidum</i> Retz.	P, Ku, K
73	Palancheera	<i>Ceropegia stocksii</i> Hook.	P, Ku, K, O
74	Palankeera	<i>Ceropegia metziana</i> Miq.	P, Ku, K
75	Palcheera	<i>Euphorbia hirta</i> L.	P, Ku, K
76	Panamchapu	<i>Caryota urens</i> L.	P, Ku, K
77	Panchithalu	<i>Cryptocoryne spiralis</i> Fisch.	P, Ku, K
78	Parachava	<i>Dryopteris cochleata</i> J. Sm.	P, Ku, K

(continued)

Table 4.2 (continued)

Sl no.	Local name	Botanical name	Knowledgeable sociocultural group ^a
79	Parippukkeera	<i>Chenopodium album</i> L.	P, Ku, K
80	Paruthiyila	<i>Hibiscus hispidissimus</i> Griff.	P, Ku, K, O
81	Poninthavara	<i>Cassia occidentalis</i> L.	P, Ku, K
82	Ponnamkanni	<i>Alternanthera sessilis</i> R. Br.	P, Ku, K, O
83	Poola	<i>Bombax ceiba</i> L.	P, Ku, K, O
84	Poovarasu	<i>Thespesia populnea</i> Soland.	P, Ku, K
85	Puliyarila	<i>Oxalis corniculata</i> L.	P, Ku, K, O
86	Sambar cheera	<i>Talinum cuneifolium</i> Willd.	P, Ku, K, O
87	Thaivasoppu	<i>Pteridium aquilinum</i>	P, Ku, K
88	Thavara	<i>Cassia tora</i> L.	P, Ku, K, O
89	Thazhuthama	<i>Boerhaavia diffusa</i> L.	P, Ku, K, O
90	Unnithandu	<i>Costus speciosus</i> (Koen.) Smith	P, Ku, K
91	Valiyakadaladi	<i>Achyranthes aspera</i> L.	P, Ku, K, O
92	Vallimaruma	<i>Cissus discolor</i> Bl.	P, Ku, K
93	Vasalachapu	<i>Basella alba</i> L.	P, Ku, K, O
94	Vattachappu	<i>Marsilea quadrifolia</i>	P, Ku, K
95	Vayalthalu	<i>Colocasia esculenta</i> (L.) Schott.	P, Ku, K, O

^aP Paniya, K Kattunaikka, Ku Kuruma, O others
Narayanan et al. (2004)

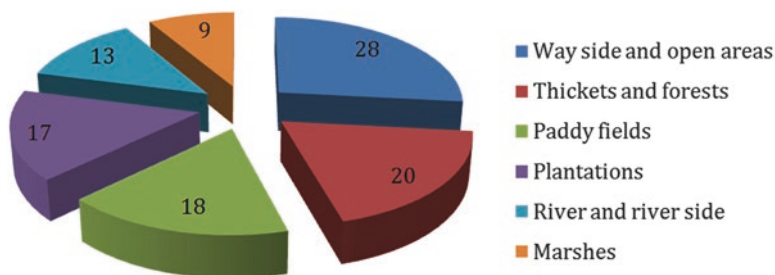


Fig. 4.2 Leafy green and its abundance in relation with different landscapes (Narayanan et al. 2004)

families who consume about 21 types of wild edible leaves and the settlers who restrict themselves to between 8 and 14 types of leafy greens. Most of these species are herbs (90%), and very few are trees. An analysis of dependency on various landscapes for collecting these plants (Fig. 4.2) shows that wayside and open areas provide the maximum species (28) followed by thickets and forest (20 species), paddy fields and associated ecosystems (18), plantations (17), river and riversides (13) and finally the marshy areas (9).

Tubers and Roots More than 25 wild plant species/types in Wayanad are known for edible roots, tubers and rhizomes and are eaten by the Adivasi and non-Adivasi communities of the district. Of these, 19 are species/varieties of *Dioscorea*, which is the main tuber plant known and used in this region. Wild *Dioscorea* species are still a major source of food for forest-based communities like Kattunaikka, and these serve as a 'life-saving' plant group during periods of food scarcity. The communities who are dependent on wild *Dioscorea* for their food classify each member of this genus, based on characteristics like edibility, taste, colour, size, direction of growth, fibre content, cooking properties and occasionally the proliferation underground. The Kattunaikka calls these tubers as 'Galasu', and Narayanan et al. (2004) documented that they know about 21 different Galasu. Among the varieties known to them, Vennigalasu (*D. hamiltonii*), Hehkkugalasu (*D. belophylla*) and Kavalagalasu (*D. oppositifolia*) are seen in interior evergreen and moist deciduous forests and Eragalasu (*D. wightii*) in rocky grasslands. Nooragalasu (*D. pentaphylla*), Naragalasu (*D. wallichii*) and Hendiridaegalasu (*D. bulbifera*) are found in wayside bushes and Boojikavalagalasu (*D. pubera*) in marshy areas. The Kattunaikka collect *Dioscorea* from almost all these places but more frequently from the forests and other such unmanaged habitats (Table 4.3).

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 and 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 in which the Kattunaikka community depends more. Salugalasu, which is 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, which leave an itching sensation when consumed, particularly on children, making communities other than the Kattunaikka shy away from this tuber. The Paniya community, the study recorded, use roots and tubers of 19 plant species as their food. As in the case of Kattunaikka, *Dioscorea* (Kattukachil or Kattukizhangu) forms an important source of their food. They consume nine kinds of *Dioscorea* tubers, in which the most preferred ones are Kavalakizhangu (*D. oppositifolia*) and Noorakizhangu (*D. pentaphylla* var. *pentaphylla*). They consider the Noorakizhangu and Kavalakizhangu to be rich in 'Podi'

Table 4.3 Wild *Dioscorea* species consumed by Kattunaikka of Wayanad

Sl no.	Scientific name	Local name	Available landscapes
1	<i>Dioscorea pentaphylla</i> var. <i>pentaphylla</i>	Noora	Moist deciduous forest
2	<i>Dioscorea pentaphylla</i> var. <i>rheedii</i>	Korana	Moist deciduous forest
3	<i>Dioscorea pentaphylla</i> var. <i>communis</i>	Chenakorana	Moist deciduous forest
4	<i>Dioscorea pentaphylla</i> var. <i>linnaei</i>	Hendhikorana	Moist deciduous forest
5	<i>Dioscorea hispida</i>	Kottunooraa	Moist deciduous forest
6	<i>Dioscorea</i> sp.	Moodavenni	Moist deciduous forest
7	<i>Dioscorea hamiltonii</i>	Kaluvenni	Evergreen and moist deciduous forest
8	<i>Dioscorea belophylla</i>	Hekku	Moist deciduous forest
9	<i>Dioscorea</i> sp.	Hekkuheruman	Moist deciduous forest
10	<i>Dioscorea</i> sp.	Heruman	Moist deciduous forest
11	<i>Dioscorea wallichii</i>	Narra	Wayside bushes
12	<i>Dioscorea</i> sp.	Narramooyan	Wayside bushes
13	<i>Dioscorea oppositifolia</i>	Kavalakalasu	Evergreen and moist deciduous forest
14	<i>Dioscorea wightii</i>	Erekalasu	Rocky grass lands
15	<i>Dioscorea intermedia</i>	Shoddikalasu	Dry deciduous forest
16	<i>Dioscorea pubera</i>	Boojikavala	Marshy areas
17	<i>Dioscorea pentaphylla</i>	Noora korana	Wayside bushes
18	<i>Dioscorea tomentosa</i>	Salu	Moist deciduous forest

Narayanan et al. (2004) and Balakrishnan (2009)

(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. Kuruma, Wayanadan Chetty and other settler communities know only three species of *Dioscorea*. Fifteen to 20 years ago, men of these communities used to collect Kavala and Noora, but today wild tubers do not flavour their diets. They consider it too tedious, a job to search and dig out the tuber, being otherwise engaged. They grow several tubers in their home gardens, and these are none too costly in the markets either. All the different sociocultural groups have got *Dioscorea alata* as a cultivated species in their home garden. An interesting side is that in Chooralmala area of the district, Muslim, Hindu and Christian women buy Kavala and Noorakizhangu from the Paniya in exchange for money or rice. Many of the youngsters of these communities are but totally ignorant about these tubers or their importance mainly because wild *Dioscorea* is no more a part of their diet. Nannari (*Hemidesmus indicus*), Muthanga (*Cyperus rotundus*), Shatavari (*Asparagus racemosus*), Unnithandu (*Costus speciosus*), various species of wild curcuma and wild ginger are some of the other wild plants used for roots, rhizomes and tubers by various sociocultural groups of the study area and are often used as important ingredients in certain traditional medicines.

Fruits and Seeds Fruits and seeds are an important group of edibles, which contribute to the Adivasi communities' nutritional requirements. Much of their vitamin and mineral needs are met by this category of food. Information on 60 such fruits and seeds (fruits 54, seeds 6) was collected by Narayanan and Anil 2007 (Table 4.4). Among the fruit-yielding plants, 33 are trees, usually found in the 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 the study sites. The fruits of these trees (except *Ficus*) are widely used by people across communities on a regular basis. Various *Ficus* varieties are protected, either for their sanctity or because the birds feed on them or because they host nocturnal animals like bats which are beneficial to the crops. Paniya communities are the largest consumers of various wild fruits. There are about 50 species that are consumed by this community alone, largely collected from forests, wooded hills or such unmanaged areas. The non-Adivasi communities restrict themselves to the fruits of jack, mango, gooseberry and njaval trees and generally avoid the lesser-known fruits from the forests.

Mushrooms About 2500 species of mushrooms are reported from across the world, but only a few of the wild mushrooms are eaten by the rural population. Besides their diverse and interesting culinary uses, mushrooms are much endowed with nutritional and medicinal value. Some mushrooms are reported to contain cancer-fighting properties, and several aid the body's immune system. Many of these are good sources of protein, vitamins and minerals. The carbohydrate content in mushrooms is very low; therefore, these are specially recommended to diabetic and anaemic persons, owing to their high folic acid content. Thirty-five different wild mushrooms are consumed by the people of Wayanad (Table 4.5), especially the Kattunaikka who call mushroom as 'Anavae'. They classify the mushrooms as Maranavae mushrooms seen on the bark of different trees, Huthaanavae those seen on termite mounts and Mannanavae which are on the forest floor and associated habitats. The availability is seasonal and specific to their habitats and host plants. This delicacy is usually available after the onset of the monsoons. The most commonly consumed mushrooms are Arikoon, Puttukoon and Perumkali.

Some 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 Huthaanavae. The one, which is milky white in colour, is called Vellanavae, the pale white in colour is Ummanavae and the large-sized off-white coloured is typical Huthaanavae. 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. '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:

Table 4.4 Wild edible fruits and seeds of Wayanad

Sl no.	Local name	Botanical name	Knowledgeable sociocultural group ^a
1	Arinjaval	<i>Syzygium densiflorum</i> Wall.	P, K
2	Athapala	<i>Chrysophyllum lanceolatum</i> Bl. (DC.)	P
3	Athipazham	<i>Ficus racemosa</i> L.	K, Ku, P, O
4	Ayanichakka	<i>Artocarpus hirsutus</i> Lam.	K, Ku, P, O
5	Chadachikkaya	<i>Grewia tiliaefolia</i> Vahl.	P, K, O
6	Chakadahannu	<i>Schefflera oleracea</i>	L, K
7	Chalir	<i>Flacourtia montana</i> Graham	P, Ku, K,O
8	Chammikkaya	<i>Aponogeton appendiculatus</i> van Bruggen	P
9	Chekkipazham	<i>Ixora coccinea</i> L.	K, P, K
10	Deprahannu	<i>Diospyros</i> sp.	K
11	Eachil	<i>Aporosa lindleyana</i> Baill.	P, O
12	Edavahannu	<i>Leea indica</i> L.	K
13	Eenthukaya	<i>Cycas circinalis</i> L.	P, K, Ku, O
14	Elanchipazham	<i>Mimusops elengi</i> L.	P, O
15	Geru hannu	<i>Buchanania axillaries</i> (Desr.) Ram	K
16	Hallaekaya	<i>Grewia</i> sp.	K
17	Kalanthatta	<i>Sterculia foetida</i> L.	P, O
18	Kandakarichunda	<i>Solanum xanthocarpum</i> Schrad.	P, K, Ku, O
19	Karinjavel	<i>Syzygium gardneri</i> Thw.	P, K, Ku
20	Karuvachakka	<i>Solena amplexicaulis</i> (Lam.) Gandhi	P, K, O
21	Kattambazham	<i>Spondias indica</i> Wt.	P, Ku, O
22	Kattuchakka	<i>Artocarpus heterophyllum</i> Lam.	K, Ku, P, O
23	Kattujadikka	<i>Myristica malabarica</i> Lamk.	P, O
24	Kattukariveppu	<i>Clausena heptaphylla</i> (Roxb.) Wight	P, K
25	Kattukodampuli	<i>Garcinia gummi-gutta</i> (L.) Robs.	P, K, Ku, O
26	Kattumanga	<i>Mangifera indica</i> L.	P, K, Ku, O
27	Kattu-munthiri	<i>Rubus fulvus</i> Focke	P, K, Ku, O
28	Kattunjaval	<i>Syzygium laetum</i> Ham.	P, K
29	Kattuthakkali	<i>Passiflora calcarata</i> Mast.	P, O
30	Kirinda	<i>Scleropyrum pentandrum</i> (Dennst.) Mabb.	P
31	Kongini	<i>Lantana camara</i> L.	P, K
32	Koovalam	<i>Aegle marmelos</i> Corr.	P, O
33	Kottamullu	<i>Ziziphus jujuba</i> Lamk.	P, Ku
34	Kottapazham	<i>Ziziphus oenoplia</i> (L.) Mill.	P, Ku, K, O
35	Kottilampazham	<i>Elaeocarpus tuberculatus</i> Roxb.	P, K, O

(continued)

Table 4.4 (continued)

Sl no.	Local name	Botanical name	Knowledgeable sociocultural group ^a
36	Kulayari	<i>Bambusa arundinaceous</i> Willd.	P, K, Ku
37	Kurukkanchunda	<i>Solanum ferox</i> L.	P, Ku, K, O
38	Motampuli	<i>Physalis minima</i> L.	P, K, Ku, O
39	Mottilthoory	<i>Baccaurea courtallensis</i> Wt.	P
40	Mudungakaya	<i>Solanum nigrum</i> L.	P, Ku, K, O
41	Mukayani	<i>Bridelia retusa</i> Spreng	P
42	Mulluvalli	<i>Toddalia asiatica</i> (L.) Lamk.	P
43	Neeli pazham	<i>Bischofia javanica</i> Bl.	P, K
44	Nelli	<i>Emblica officinalis</i> Gaertn.	K, Ku, P, O
45	Nendravally	<i>Bridelia scandens</i> (Roxb.) Willd.	P
46	Njara pazham	<i>Syzygium cumini</i> (L.) Skeels	P, K, Ku, O
47	Njara pazham	<i>Syzygium caryophyllatum</i> (L.) Alston	P
48	Njenumkaya	<i>Gnetum ula</i> Brogn.	P, O
49	Njotanjodian	<i>Physalis mouritiana</i> L.	P, O
50	Palakkai	<i>Palaquium ellipticum</i> (Dalz.) Engl.	P, K, O
51	Palapazham	<i>Glycosmis pentaphylla</i> (Retz.) DC.	P, Ku
52	Pillandi	<i>Melastoma malabathricum</i> L.	P, O
53	Pindichakka	<i>Randia uliginosa</i> DC.	K, Ku, P
54	Poochapazham	<i>Syzygium zeylanicum</i> (L.) DC.	P, O
55	Poodapazham	<i>Passiflora foetida</i> L.	P, K, O
56	Putharichunda	<i>Solanum torvum</i> Sw.	P, K, Ku, O
57	Thanikkuru	<i>Terminalia bellerica</i> Roxb.	P, O
58	Thodali	<i>Ziziphus rugosa</i> Lamk.	P, Ku, K, O
59	Tholnjal	<i>Syzygium hemisphericum</i> Bedd.	P, K, Ku
60	Undanjaval	<i>Syzygium mundagam</i> Bourd.	P, K, Ku

^aP Paniya, K Kattunaikka, Ku Kuruma, O others
Narayanan et al. (2004)

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 (cow dung), 'Vaikkolkumma' sprouts on vaikkol (paddy straw), 'Kathukkumman' the one that has the shape of 'Kathu' (human earlobes) and 'Ambukkumman' the one that has the shape of 'Ambu' (arrow). The Kuruma refers to mushrooms as 'Koonu', the same popular Malayalam word for it, and it finds pride of place in the family menu when available. Though around 14 species are consumed by Kuruma, they only prefer the 'Koonu' seen on soil, especially, those associated with termite mounts. The most commonly consumed mushrooms are Perumkoonu, Arikoon, Nedumthali and Puttukoon. Compared to the Adivasi communities, others use only very few

Table 4.5 Wild edible mushrooms of Wayanad

Sl no.	Local name	Landscape
1	Nettanavae	Forest floor
2	Mavanavae	Dried mango trees
3	Huthaanavae	Termite pit soil
4	Monjanavae	Soil
5	Kattanavae	On dried bamboo
6	Chulliyanaavae	Grasslands
7	Maranavae	Dried trees
8	Kozikalanavae	Bamboo forest
9	Kachikalanave	Soil
10	Chorakalanavae	Riverside, toil
11	Thorathalanavae	Tree
12	Vendageenkananavae	On <i>Lagerstroemia</i> trees
13	Jalanave	On <i>Terminalia</i> trees
14	Komananavae	On <i>Mangifera</i> trees
15	Uppuhuriyananavae	Forest floor
16	Karanavae	Plantations
17	Kaykananavae	Plantations
18	Therikanavae	Plantations
19	Sunkgeenkan	Trees
20	Kavananavae	Soil
21	Pellikuthananavae	Forest floor
22	Njerananavae	On <i>Syzygium</i> trees
23	Ummananavae	Soil
24	Marageenkananavae	Tree
25	Penankivi	Soil
26	Vellanave	Termite pit soil
27	Vendanavae	Forest floor
28	Mukkanavae	Plantations
29	Kolanavae	Forest floor
30	Naymulanavae	Paddy, grassland
31	Kodankimianavae	On dried <i>Erythrina</i> bark
32	Mayilpeelikumman	Near bamboo forest
33	Mottananavae (karadi)	Forest floor
34	Vennanave	Forest floor
35	Valanavae	Cow dung

Narayanan et al. (2004)

mushrooms, largely the Arikoon and Puttukoon, which are considered highly delicious. Among the non-Adivasi communities, Muslims refer to different varieties of mushrooms by distinct names like Mothirakkanikoon, Pavakoon, etc.

Honey Honey is one of the most important minor forest produce for most Dravidian Adivasi communities. It features as a major constituent of their diet as well. The Adivasi communities classify different types of honey according to the type of bees and the nature of hives from which they are collected, and they vary greatly in taste and therapeutic properties. Adivasi communities are among the most skilled in locating, extracting, processing and preserving honey and among the most knowledgeable about the dietary and curative properties of honey. Kattunaikka are also known as Jenukkurumba because of their exceptionally high skill in ‘Jen’ (the Kattunaikka word for honey) collection. They recognise five types of ‘Jen’: Kombujen/Daddanjen, Thudajen, Gandajen/Dojjan, Nasarjen/Kothukujen and Kusumbujen/Cherujen. The bulk of the honey comes from hives seen in the branches of tall trees or rock crevices (Kombujen, more than 25 kg/hive). The bees that produce this honey are larger in size and yellowish in colour. Honey is also differentiated based on the season of availability, as Kannijen which is available in bulk during Kanni Masam (Sept–Oct) and Karthijen which is available in Karkkidakam (July). The availability and quality of honey are based on the flowering of forest trees in the locality. Flowering of Venthekku (*Lagerstroemia lanceolata*) signals abundant availability of Kombujen. The hives of Thudajen/Pothujen are mainly seen in tree crevices or in inactive white ants’ pits. The colour of the honey is reddish brown, and its availability is usually based on the flowering of Mattimaram (*Terminalia tomentosa*). The Jenukkurumbas are experts in inducing the small bees of the *Melipona* species to hive in bamboo stems, to get an almost ‘captive supply’ of the delicious cherujen. Cherujen is the most precious of the various varieties of honey, sparsely produced, difficult to extract and believed to possess excellent nutritional and medicinal attributes. It is available round the year. The Kattunaikkas are expert honey tasters and will link the distinct tastes to specific forest flowers. Kedujen/Kothukujen is mainly seen on dry branches of bushy plants, and the bees are comparatively smaller.

Crabs Crabs are yet another wild food habitually consumed by the dominant Adivasi communities of Wayanad (Table 4.6). The Paniya collect five kinds of crabs regularly. These are Vellanjendu, Palnjendu, Kundunjendu, Kottinjendu and Karinjendu. All of these varieties are abundantly available during the rainy season in habitats like paddy field and associated habitats. The Kuruma consume three of these, Kolathinjendu (Vellanjendu), Karinjendu and Kundunjendu. Kattunaikka refer to the crabs as ‘Nelli’, and their names for various varieties of crabs are Kottinelli, Gundranelli, Valanelli, Halnelli and Kallunelli. Except the Halnelli, all the other varieties are consumed by the Kattunaikka community. Palnjendu is a small crab, found inside the root clusters of paddy seedlings. These are caught while transplanting the paddy seedlings, and along with fish, they make a delicious supper. This crab, white in colour, occasionally sheds its outer shell and is then very

Table 4.6 Crabs in the dietary system of different sociocultural groups

Sl no.	Local name	Knowledgeable sociocultural group ^a	Available landscape
1	(Vellanjendu) Kolathinjendu Valanelli/Vayalnjendu	P, Ku, K, O	Paddy fields
2	Palnjendu/Muthachinjendu	P	Paddy fields and associated marshy areas
3	Kundunjendu, Gundranelli	Ku, K	Marshy areas and plantations
4	Kottinjendu, Kottinelli	K	Marshy areas
5	Karinjendu, Kallunelli, Puzhanjendu	P, Ku, K, O	River and streams

^aP Paniya, K Kattunaikka, Ku Kuruma, O others
Narayanan et al. (2004)

slimy. During this time, it has little flesh, and if the legs are broken, a milky juice oozes out (thus earning it the name Palnjendu). It is not eaten when its shells are shed. Kundunjendu/Gundranelli is the smallest crab and the tastiest one as well. Their tentacles are longer, compared to the other crabs. Normally the shell of this crab is brown in colour and changes to white on ageing. The shell of this variety has got numerous lines, and it is available in plenty after the monsoon rains. Vellanjendu/Valanelli found in the paddy fields is pale yellow in colour with lines on the shell. This is the most frequently consumed crab by the Paniya and the Kattunaikka. Other communities (Chetty, Hindu, Muslim and Christian) distinguish mainly two kinds of crabs and have named them based on the habitat. Vayalnjendu are crabs found in paddy fields, and Puzhanjendu are those found in rivers. Only the crabs that are found in the river are preferred by these communities.

Fish The Paniya community has knowledge of 36 edible fishes, and almost all these species are available throughout the year (Table 4.7). Some of these species are also known to Kuruma community. Out of these, about 20 are strictly inhabitants of rivulets and streams but were seen to enter the paddy fields during heavy rain. The most frequently harvested fish by Paniya are Kalluppatti, Koyma, Konjai, Kannappae, Parel, Kaduvae, Muzhu and Kommai, which are commonly available in streams irrespective of the season. A big-sized fish called Malanjil found in plenty once has now become very rare. They attribute the disappearance of this species to the chemical pollution of streams from the pesticides sprayed in the plantations.

4.3 Gender Dimensions of Wild Edible Collection and Utilisation

Gender studies show that a majority of plant species and varieties used for food and medicine are conserved and managed at household level by women (Gurung and Jeannette 1997; Balakrishnan 2000). The role of gender in enhancing food security

Table 4.7 Wild edible fish species of Wayanad

Sl no.	Local name	Landscape	Knowledgeable sociocultural group ^a
1	Mushu	Stream, river	P, K, Ku, O
2	Kaduve	Stream, river	P, K, Ku, O
3	Parel	Paddy fields	P, K, Ku, O
4	Njenu	Stream	P
5	Kalleppatti	River	P, K, Ku, O
6	Koyma	Stream, river	P, Ku
7	Kanneppe	Stream, river	P, Ku
8	Aaral	Big river	P, K, Ku, O
9	Thodameen	Stream, river	P, K, Ku, O
10	Kaichalu	Big river	P, Ku
11	Kalancheppi	River	P
12	Chakkamullan	River	P, K, Ku, O
13	Chempally	Big river	P, K, Ku, O
14	Chethil	Big river	P, K, Ku, O
15	Philoppy	Paddy fields, stream	P, Ku, O
16	Kottavala	River, stream	P, K, O
17	Malanjil	River	P, K, O
18	Thalammakkannan	Stream	P, K, Ku, O
19	Thuppal kothi	Streams	P
20	Pullipparal	Streams	P, Ku, O
21	Vattapparal	Streams	P, Ku
22	Paralam paral	Streams	P
23	Kakkaparal	Streams	P, Ku
24	Thalavannan paral	Streams	P, O
25	Kammai	Streams	P
26	Kooriparal	Streams	P, O
27	Attuvala	River	P, K, Ku, O
28	Pulvala	River	P, Ku, O
29	Pullumeen	Streams	P, K, Ku
30	Chillumullam	Streams	P
31	Choorikoyma	Streams	P
32	Cheriyakoyma	Streams	P
33	Konachan red	Streams	P, K, Ku, O
34	Konje	Streams	P, K, Ku, O
35	Kumbalappotti	Stream	P, Ku
36	Vannal	Paddy	Ku

^aP Paniya, K Kattunaikka, Ku Kuruma, O others
Narayanan et al. (2004)

has been also a major topic of discussion (Price 1993; Kanvinde 1999). Many authors have attempted to understand the roles, responsibilities and relations of women and men in collection, processing, cooking, consumption and management of various food species available to them in the wilderness. Kanvinde et al. (2001) show that women are responsible for all the leafy greens collected, processed and cooked. Borjas (Borjas 2001) argues that women's ability to conserve biodiversity and influence the way that others conserve is eroding rapidly. The author cites several reasons for this: the dwindling of forests and other land resources that women depend on, introduction of cash crops and modern varieties that displace the traditional crops, out-migration of males from rural areas that leaves women to manage agriculture without access to labour and other such critical resources, erosion of women's rights to private land and the disparagement of their native diets.

Gender roles and responsibilities assigned by the society give women the predominant role in collection and processing of wild greens for consumption. As in the case of other socially assigned female roles, this requires patience and is time-consuming. Women consider it as their responsibility, and this role does not vary on account of religion, ethnicity or class. Women perform cent percent of all labour inputs required, from collection to processing and serving. They have knowledge about each and every plant, such as its location, availability, factors influencing palatability, nutritional value and so on. For collection of the greens, women of Paniya community walk considerably long distances compared to other categories of women. The traditional dressing style of Paniya women is attuned to storing and carrying comfortably the collected foodstuffs from field. At times they are seen using bamboo baskets or areca palm sheath to carry the collected materials. Compared to the other women, Paniya and Kattunaikka women are more experienced and knowledgeable regarding collection and storage. Men, especially the Paniya and Kuruma youth and certainly the menfolk of settled communities, look upon wild green collection as beneath their dignity, but there are exceptions also. Generally though, it is considered that the man's role is to get the staple food like rice or tubers, and it is the women's duty to add diversity and flavour by getting the leaves. Since many of the leaves are seasonal, they ensure year-round supply to supplement their diet by zeroing in on commonly available greens specific to the seasons. Women thus use the resource in a variety of beneficial ways, not restricting themselves to just the commonly used leaves. They also adopt various processing methods to make the edibles consumable and palatable. According to the usefulness of each species, the women adopt various management mechanisms for its conservation and sustainable usage.

In the collection, processing and management of *Dioscorea*, we can clearly see differences in gender roles in each sociocultural group. In the case of Kattunaikka, the entire task is shared by both men and women except for tool making for collection. In the case of Paniya, there is a clear division of tasks except for the responsibility of ensuring the long-term availability of tuber. Both men and women make it a point to retain a piece of tuber in the pit for regeneration. In the case of Kuruma, there is no involvement of women in the collection and management, and men play a predominant role in the identification and collection of other tubers. Though

women are also involved in collection to support men, processing is left completely to women, and they hold the related knowledge. Men and women of Kattunaikka community 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. Commonly, men and women go together for collection. Kattunaikka women used to introduce several of the species of *Dioscorea* into their home gardens. For the Paniya community, tuber collection is a highly seasonal activity because of the distance from the forest and is undertaken only two or three times in a year. Before venturing out for collection, both the men and women discuss and plan the locations, timing, tools and materials to be taken, etc. Women avoid going alone to the interior forests for fear of wild elephants. The digging out of the tubers is a collective effort involving both men and women. Men are experts in making the tool to dig out the tuber. While men dig out the tubers spotted, women go around locating fresh *Dioscorea* plants and spotting the exact location of the tuber underground, which needs a lot of patience. Digging out the tuber is a collective effort, and while men are digging out the tubers, women help them by removing the soil, stones, etc. from the pit. Women also dig out the tubers but only those that are shallowly rooted. It was observed that Paniya men and women above 40 years of age have a clear idea about the tuber's growing pattern. However, men are better informed in identifying different roots and tubers based on the shape and texture of their leaves and vines.

It is observed that while men and children seek after fruits and seeds based on their individual preferences, women consider the requirements of the family as a whole. Women go out specifically to collect such fruits accompanied by children or sometimes men. When women go alone, they use long poles to harvest fruits like jack and gooseberry. It is not an unusual practice for them to leave the upper branches of fruit trees unharvested or selectively harvested for the birds and other animals to savour. Gooseberry (*Embllica officinalis*) is one of the most widely collected non-wood forest produce, and it is an important source of income for Kattunaikka families. Both women and men are engaged in its collection and sale. Kuruma women are rather selective in their choice of fruits. They accord greater preference to mango and jack. Women have specific knowledge about recipes and storage techniques. An important seed, which the Paniya and occasionally the Kattunaikka largely use, is that of bamboo (Mulayari). Bamboo flowers very rarely, and at the onset of the flowering season, the Paniya women start preparations for the collection of seeds. Women go to the bamboo brakes before fruit setting and clear the undergrowth and prepare a clean bed for the seeds to fall. The collection may continue for days, and together men and children join in gathering the seeds.

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. Women also take interest in protecting the wild habitats and areas in the home gardens where mushrooms naturally sprout. It was noticed that women protect the termite mounds and the tree species, which host certain mushrooms. While the collection and processing are in the women's domain, men help in some specific activities like collecting mushrooms that are seen on tall tree

trunks or in the interior of forest. The women use different criteria, like culinary qualities, palatability, and nutrition, while selecting and conserving mushrooms. Kattunaikka women, among the others, are more adept at distinguishing between poisonous and non-poisonous varieties. While collecting mushrooms from tree trunks, maximum care is given to harvest only the fruiting body and spare the basal portion to sprout again. Among the Paniya community, men sometimes help women in collection. But women of the community consider it as their responsibility to collect, process and cook such delicacies. Normally men bother to collect only those mushrooms, which are either very tasty or rare in distribution, which they come across while out on other errands. Men also avoid those mushrooms which require patient tedious labour to collect. Paniya women are also experts in identifying edible and nonedible mushrooms. The Paniya women in general distinctly remember the time of the year and the specific locality where mushrooms are available. Among the Kuruma community, collecting mushrooms is considered exclusively the woman's job. Despite the growing trend in this community of women being increasingly confined to their households and men assuming the role of sole breadwinners, the Kuruma women retain enough knowledge about the nature and kind of mushrooms, which can be stored or eaten instantly. The 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 habitation. The Kuruma women search for mushrooms only in their surroundings, mostly in the hill slopes or in coffee or teak plantations. But for a little support extended in collection by the men of Paniya and Kattunaikka communities, women shoulder the entire responsibility of mushroom harvesting, processing and dish preparation.

The Kattunaikka have developed over time a host of techniques for honey collection. A honey expedition into the forest requires much preparation and proactive thinking. If the honey is located far away from the dwellings, a whole group of men and women join the foray and stay in the forests through the period of collection, which might stretch to 2 weeks or more. Both men and women are good at locating the hives and easily pick up the sound of different bees in flight. These bees are watched and followed to the hives. Sometimes both men and women together set out to the forests, about a month before the season, to locate the beehives. Usually a group of three to five members is involved in honey collection. While in the specific act of extraction, especially when the beehives are located on tall trees, women may not be involved, they are crucial in providing the logistics. These include procuring the necessary tools, organising the required provisions for the period of extended stay in the woods and cooking the food for the whole group during the days, in other words, most of the tedious work. The bees are driven away by driving smoke into the hives using fresh green grass, which is collected by women. Collecting Pothujen/Thudajen from tree crevices and termite mounts is considered comparatively easy, and women participation in it is greater. Kattunaikka women take special interest in collecting Cheruthen, as it is believed to be highly nutritious and medicinal and is best suited for infants. The collection of this type of honey involves much labour and a great deal of patience, and men normally avoid the task. Other communities

like Paniya and Kuruma also collect honey occasionally. The women of these communities hardly involve themselves in honey collection or processing, the exception being the hill Paniyas, who are experts in honey collection, and both men and women are involved in its collection.

Normally among Paniya and Kuruma communities, the women and children are involved in catching crabs. The men have no dearth of skills in the job either; some of the older male members told us of a variety of techniques in unearthing the crabs from their holes and seizing it without hurting your fingers. Among the Kattunaikka, as a practice both men and women are together involved in the collection. Normally in the Paniya and the Kuruma tribes, women take independent decisions to go hunting crabs and take the children along. Among the Kattunaikka, both men and women set out together for collection, except to the habitats in the close vicinity of their homes, where the women alone go, along with children. Invariably women do the processing. Women are good at identifying the presence of the crabs judging from the nature of the small soil mount deposited outside the crab's pit. In all the communities, women and girl children do the processing and cooking. Paniya women have profound knowledge about the breeding time of crabs.

Fishing is an important activity for men, women and children among the Paniya community studied. Though fish is available irrespective of seasons, the fishing activity is more during summer as the reduced water level in the streams makes fishing easier then. There is a flurry of fishing at the onset of monsoon as well, but this is mainly by women of the Kuruma community. Kuruma and Paniya women are capable of approximating quantity and kind of fish available, judging from the intensity and pattern of rain. Kuruma men use Vala (fish net), Ambu (arrow) and Choonda (hook) for catching fish. Kuruma women use a special trap called Chada, made of bamboo splices. Making the Chada calls for good skills, and placing it aptly needs expertise as well, both of which are the forte of Kuruma women. Fishing is of ritualistic significance as well for the Kuruma. A practice that has all but died out is that on the third day after marriage, the bride is escorted by the women of the groom's settlement to the nearby stream, where she is expected to demonstrate her fishing skills. After the breaking of pollution on the third day after a death (Pulakuli), men of the household go for hunting and the women for fishing. The fish and meat so obtained are cooked and first ritualistically offered to the ancestral spirits and then consumed by the members of the clan. Among the Paniya and the Kattunaikka, fishing is a collective effort involving all the family members. Still, the decisions regarding the choice of location, the time of fishing and the mode of catching fish are all taken by the men. The women of non-Adivasi communities are not involved in fishing. Irrespective of the communities studied, women do the processing and cooking of fish. Analysis of the gender roles in collection of fish by Paniya shows that 10, out of 34 species, are collected only by men and three species only by women, while all the other species are collected jointly by men, women and children. The species collected only by men are mostly seen in the big rivers and streams inside thick evergreen forests. Women, evidently, find these habitats inaccessible.

4.4 The Changing Scenario

Habitat Loss for Wild Edibles: The Conversion of Paddy Fields The paddy fields of Wayanad had been a veritable treasure trove of a variety of leafy greens and a host of other wild food, regularly accessed by the Adivasi communities, especially the Paniya and the Kuruma. Paddy fields, as they existed nearly two decades ago in Wayanad, provided food, employment and ecological security to these people. 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 agroecosystem. The 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, the 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, Kuruma and Kurichya communities are strongly intertwined with this ecosystem. From an ecological view point, the paddy fields situated in the low-lying areas of the undulating Wayanad terrain act 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 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.

Paddy fields in the district, which once occupied a major portion of the cultivable area, have marked a drop by 66% (from 30,000 ha to 10,230 ha) during the period 1980–1981 to 2012–2013 (DES 1983, 2013). This agroecosystem is under increasing threat in the form of habitat loss, land reclamations and other alternate unsustainable land use. The shift in land use from paddy cultivation to the banana crop, with its attendant reduction in the water content of the soil and the high infusion of chemical fertilisers and insecticides, has taken a heavy toll. Another very important social and economic repercussion is the loss of employment opportunities of Paniya women, which has forced them to go in search of jobs even to remote places. There is a clear need for a more rational and sustainable management of remaining paddy fields in the district, not merely because the production of the staple food of populace is affected but also because its preservation is inextricably linked to the food supply chain. The availability and benefits of greens, fish and crabs and a host of other locally important products depend on the paddy fields remaining intact.

Overapplication of Chemicals Studies have shown that the unscientific application of chemical pesticides, weedicides, fertilisers, etc. in the coffee, tea, cardamom and banana plantations has considerably reduced the population of common edible greens and mushrooms. Paniya women of Mutharikkunnu cited an incident where five members of a family had to be hospitalised after consuming greens collected

from a banana plantation sprayed with toxic pesticides. The feeling that wild greens may not be safe anymore has also reduced its consumption according to these women.

Invasion of Alien Species All open clearings like waysides, grazing lands, new plantations and the fallow paddy fields are the usual sites for green leaf collection. A variety of alien species that have appeared suddenly and are getting naturalised rapidly throng these locations. 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 camara*, *Parthenium hysterophorus*, *Drymaria cordata*, etc. Sizeable areas of Muthanga wildlife sanctuary in Wayanad are highly infested with *Lantana camera* and *Chromolaena odorata*—two noxious exotics. They thrive in the area, which has been clear-felled of eucalyptus plantations. Interestingly, the eucalyptus plantation itself came into being after pristine natural forests were cleared to plant them as part of the social forestry scheme. *Mikania micrantha* is another troublesome weed found in almost all the forest fringes in the district. *Mucuna pruriens*, *Parthenium hysterophorus*, *Bidens biternata* and several species of *Blumea* are some of the quick-growing alien species, which have proliferated in different habitats in the area. Interestingly, some of these alien species, as mentioned earlier, are included in their collection of greens by the Paniya women. *Bidens biternata* (Alanchappu as the Paniya has named it) has turned out to be a delicious supplement in their food. This species, found as a weed in plantations, is sought to be controlled by the planters using strong weedicides. The *Bidens biternata* flourishes in all the open landscapes, particularly in the human-managed ones like the coffee plantations. Only the Paniya women go for this species, but it underscores the ingenuity of the Adivasi women in discovering new edible plants to replenish their food basket. It is also an assertion that “traditional knowledge” is dynamic, evolving and ever changing, with both additions and deletions over time.

4.5 Conclusions

Three hundred fifty-three species of wild edibles have been studied from Wayanad District of Kerala, part of Western Ghats. This account has also traced out the places where the wild edibles proliferate, the communities that come in search of the edible forest yield during different seasons, the colloquial terms that are commonly used to describe them and the gender roles that come into play during harvesting and processing of the wild foods. An examination of the pattern of accessing wild food from various landscapes by the different communities has brought out the following observations. The Paniya community successfully explores all the landscapes ranging from forests to grazing lands but more from the habitats outside forests – thickets, plantations, paddy fields, swamps, waysides and grazing lands/mountains. The Kattunaikka, on the other hand, forage mostly the forests, and the

Kuruma access the plantations and paddy fields. The non-Adivasi communities access largely three landscapes – the paddy fields, thickets and plantations – to collect only the most valuable species or varieties. Adivasi and rural families of Wayanad continue to conserve a wide range of plants to meet their diverse food needs. Women are more skilful in managing the surrounding landscape and are the chief knowledge holders and conservationists.

India is one of the agrobiodiversity-rich countries of the world with over 160 crop species with hundreds of varieties, 325 crop wild relatives and around 1500 wild edible plant species and diverse domesticated diversity of animals and birds (National Academy of Agricultural Sciences 1998). In stark contrast, the country has also the second-highest estimated number of undernourished people in the world (FAO et al. 2015). Kumar et al. (2015) has noted that Agrobiodiversity (including the wild edibles discussed so far) has a critical role to play in dealing with the issue of undernutrition, and hence dynamic conservation of agrobiodiversity needs to be placed high in the national development agenda for leveraging nutrition in agriculture and alleviating poverty and malnutrition.

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