# International Journal of Botany

ISSN: 1811-9700

science alert

ANSInet
an open access publisher
http://ansinet.com

International Journal of Botany 9 (2): 64-72, 2013
ISSN 1811-9700 / DOI: 10.3923/ijb.2013.64.72


# Knowledge and Use of Wild Edible Plants in Two Communities in Malai Madeshwara Hills, Southern India

[1]R.P. Harisha and [2]S. Padmavathy
[1]Ashoka Trust for Research in Ecology and the Environment, Royal Enclave, Srirampura, Jakkur PO., 560064, Bangalore, India
[2]Department of Botany, Nirmala College, 641018, Coimabatore, India

**Abstract:** The current study aims to explore the local community knowledge on the uses of Wild Edible Plants (WEPs) and assess their aid to the food security; dietry diversity and revenue of households in Malai Madeshawara (MM) Hills reserve forest. A comprehensive inventory of ethno-botanical knowledge of the forest dependent communities in MM Hills Reserve Forest has been documented. Data were composed through: (1) A survey of 120 households aimlessly chosen from a total of 355 households in four villages. (2) Focus group discussion and personal observations. Ninety-two plant species were found to be used as source of supplementary food, medicine and beverages. Fourteen of the WEPs were collected by 95% of the households. WEPs are as important as farm produce in the annual food supply. Eighty-nine of the WEPswere collected only for their own consumption. Of the ninety two WEPs, 58 species (62%) are collected from the forest and the remaining is found as weed in agricultural lands. Commuity discerns that use of WEPs is declining due to the intervention of social and food security schemes, driven dietry shift and lifestyle change. The results revealed that WEPs are of high importance to the local commuities in terms of food security, dietry diversity and cultural identity. The findings suggest further investigation of nutritional profiles, cultural values and conservational study of the reported wild edible plant species.

**Key words:** WEPs, soliga, lingayat; MM hills

## INTRODUCTION

"WEPs refers to non-cultivated edible plants seen in the natural forest, fallow land and agriculture land" (Harisha, 2012). MM Hills Reserve Forest in Southern Karnataka, India, is adjoining the Cauvery Wild life Sanctuary (WLS) and Biligiri Ranga Swamy Temple Tiger Reserve (BRT) which has a greater biological diversity. Communities such as Soligas (tribal people) and the Lingayats (non-tribals) have been residing for a long time in these forests. These forest dwelling communities depend on WEPs as supplementary food, especially during droughts and in the shortfall of agriculture produce (Harisha, 2011). These WEPs resources also provide essential nutrients vitamins and impart cultural identity to these communities (Harisha, 2012).

Since human civilization, rural communities possess rich repository knowledge on WEPs and their utilization (Scoones *et al*., 1992; Heywood, 1999; Jain, 1991). WEPs uses have been studied extensively in India by various researchers (Jain, 1991; Ayyanar and Ignacimuthu, 2005; Grover *et al*., 2002). More than thousands species of WEPs are used as food and medicine by rural communties, particularly tribal communities in India (Handa, 1998). Across the globe several authors have been exploring and documenting indegenous knowledge as part of the global intiative (Lambert *et al*., 1997; Pieroni 2001; Dovie *et al*., 2007; Ayyanar and Ignacimuthu, 2005; Bhattarai *et al*. 2009). WEPs play a vital role in their food system (Ghosh 2003; Sheldon *et al*., 1997) and are evolved over generations (Jain, 1991). WEPs use is declining rapidly due to the intervention of social and food security schemes (Harisha, 2011), change in food habit (Bussmann, 2006) and change in occupation (Shaanker *et al*., 2004).

The present study is a first ever attempt to explore, identify and document the wild edible plant resources and the indigenous traditional knowledge associated with these plant resources at MM Hills of Karnataka. The study has documented the various ethnic uses of plants which also provide an additional nutrient supplement to their daily consumption.

**Corresponding Author:** R.P. Harisha, Ashoka Trust for Research in Ecology and the Environment, Royal Enclave, Srirampura, Jakkur PO., 560064, Bangalore, India

## MATERIALS AND METHODS

**Study area:** The Malai Madeshwara Reserve Forest (MM Hills) is located in the Chamarajanagara district of Karnataka in South India, between latitude 12° 13' and 11° 55' N and longitude 77° 30' and 77° 47' E (Fig. 1). The area of reserve forest is 291 $km^{-2}$ and located on the eastern edge of the Karnataka State bordering the Tamil Nadu State. The forest forms continuumwith BiligiriRangaSwamy Temple (BRT) Wildlife Sanctuary at the south-west and with Cauvery Wildlife Sanctuary at the north-east. It serves as an important elephant corridor between these sanctuaries (Fig. 1). MM Hills receives an average annual rainfall of 1100 mm. September to November is the wettest months in MM hills with average rainfall during these months touching 900 mm. December, January and February are winter months. Summers are dry and are from mid March till May, when often the mercury level rises more than 40°C. There are about 16 settlements (villages) scattered within the reserve forests that also exert tremendous pressure on the forests for agriculture, NTFP harvesting, fuel wood collection, stone quarry and tourism (Shaanker *et al*., 2004).

**Vegetation structure:** MM Hills Reserve Forest comprises of different types of vegetation such as dry deciduous forest (64.34%), Scrub woodland (20.50%), scattered patches of moist deciduous and riparian forest (2.47%). The most common tree species are *Anogeissus latifolia*, *Chloroxylon swietenia*, *Canthium dicoccum*, *Albizia amara*, *Ziziphus mauritiana*, *Pavetta indica*, *Erythroxylon monogynum*, *Memecylon umbellatum*, *Scolopia crenata* and *Schleichera oleosa* (Murali *et al*. 1998; Aravind *et al*., 2010).

**Forest dependent communities at MM Hills**

**Soligas:** The Soligas are the indigenous people of this area who have traditionally resided in the forested regions of MM Hills. Soligas stopped practicing shifting cultivation prior to the year 1901 and are now settled in different hamlets, which were notified as revenue land in 1913, Karnataka Forest Department (KFD, 2000). The Soligas are known for their rich traditional knowledge and cultural life linked with their natural surroundings. In and around MM Hills there are 48 villages of which 23 are inhabited by Soligas. They practice agriculture in their small land-holdings and commonly grow finger millet (*Eleusine coracana*), Jowar (*Sorghum* species) and Hyacinth bean (*Dolichos lablab*) for their own consumption. They have been harvesting Non-Timber Forest Product (NTFPs) and working in stone quarries (Shaanker *et al*., 2004).

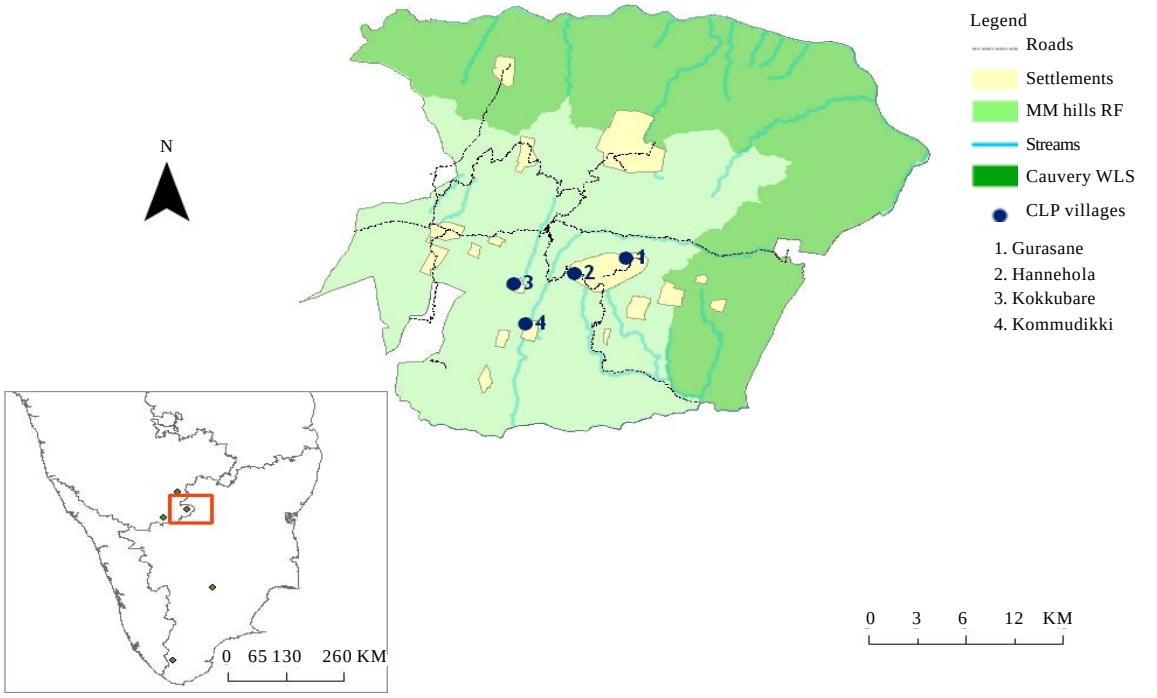


Fig. 1: Map showing the villages sampled in MM Hills

**Lingayats:** The other community living within the reserve forests is the Lingayats. Lingayats migrated to MM Hills around 600 years ago from the plain areas of Mysore district and they were mainly brought to the MM hills as local priests (History of Saluru Mutt). Though the Lingayats were brought here as priests, they have been practicing agriculture as a livelihood option. They grow finger millet (*Eleusine coracana*) and Hyacinth bean (*Dolichos lablab*). Unlike Soligas, their land-holdings are larger. Lingayat also practice NTFP collection for cash income as well as for domestic consumption. As a result of their long term dependence and links with the forest, their traditional ecological knowledge is still rich and extensive (Shaanker *et al*., 2004).

**Methods:** Using open ended questionnaire (Jain, 1991), information was collected from 120 households which were randomly chosen from four villages. Equal number of households was chosen to interview from both the communities. During interview collected information on family size, literacy, occupation, source of income and on plant based material consumed. The plant based food purchased from the local shops was also documented. Information on WEPs collected from farms and forests were documented separately. Additionally, frequency of different foods eaten, common diseases occurred, traditional healing methods and expenses incurred on allopathic medicine was gathered. Ethno-botanical data was collected from November 2011 to March 2012. The household interviews were usually 1-3 h long. Information was also collected on wild plants gathered, preparation, use and their marketability. At the end of each interview, specimens of the plant material used were collected and identified. During the course of the study, each informant was visited two-three times. Repeated visits helped us to get information that was missing from previous interviews and also helped in verifying the reliability of the data obtained. Preliminary identification and documentation (using scientific and vernacular names) was done by examining fresh plants procured by the villagers. The plant materials were identified with the help of standard local floras (Gamble, 1957; Saldanha and Nicholson, 1976). The identification of plant materials was also confirmed at Foundation for Revitalization of Local Health Traditions (FRLHT) Bangalore. A clear expression of consent was also obtained before each interview. Through this field study, the ethical guidelines adopted by the International Society of Ethno biology were observed.

**Data analysis:** The percentage of species used from the forest and farm lands was calculated. Further, the percentage of different parts used for food was calculated. The Use Index (UI) was calculated for each species using the equation UI = Us/N, where Us is the number of households which uses a particular species 's' and N is the total number of households that were interviewed in the research area (De Laucena *et al*., 2007; Phillips and Gentry, 1993).

## RESULTS

**Diversity of edible plant species:** Local communities are depending more on WEPsin addition to their regular cultivation. Natural forest and farm lands are the main sources of communities' for day to day requirements such as fruits and vegetables (92 species), medicine (68 species), agriculture implements and household tools (45 species) and spirituals (16 species) (Table 1). Of the 92 wild edible plant species which are used as food, belongs to 68 genera and 38 families. A complete list of wild edible plant species is given in appendix 1. Of the 92 wild species 58 (62%) were collected exclusively from the forest and 28 species (30%) were collected from their cultivated lands and remaining 7 species (8%) were collected from both forest and their cultivated lands (Fig. 2).

**Plant habit and parts used:** Among the different species, 43.5% of vegetables are from herbs (Fig. 3), while 72.4% of the fruits are from tree species. Climbers and shrubs are also used as vegetables and fruits but in smaller proportions (Fig. 3). Among the different plant parts, leafy vegetables constitute of 37 species (40%), fruits 43 species (47%), shoots 6 species (7%), tubers 4 species (4%) and flowers 2 species (2%) (Fig. 4). Among the plant families, 13% of species from Amaranthaceae, 10.5% from the Solanaceae and 3% from Dioscoraceae were used as leafy vegetable, fruits and tubers, respectively (Appendix 1).

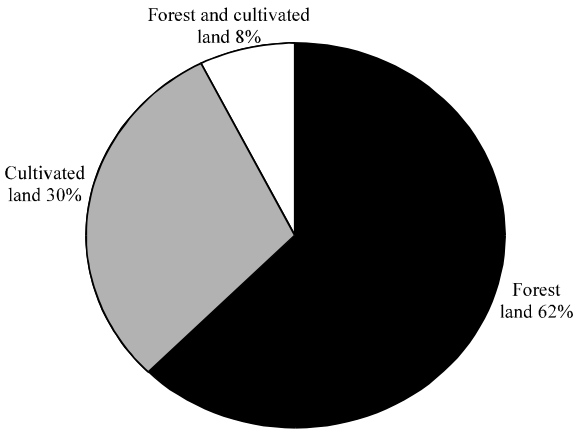


Fig. 2: Occurrence of wild vegetables in forest and cultivated land

Appendix 1: Plant species used by forest dependent people in Malai Mahadaeshwara Hills Reserve Forest

| Scientific name | Folk name | Habit | Use index (UI) | Parts used | Usage | Occurrence |
|---|---|---|---|---|---|---|
| **Amaranthaceae** | | | | | | |
| *Alternanthera sessilis* (L.) R. Br. | Angone soppu | Herb | 0.04 | Young stems and leaves together | Vegetable | F |
| *Celosia argentea* L. | Anne soppu | Herb | 1.00 | Young stems and leaves together | Vegetable | C |
| *Amaranthus tristis* L. | Bilikeere soppu | Herb | 0.57 | Young stems and leaves together | Vegetable | C |
| *Amaranthus polygonoides* L. | Dagalikeere soppu | Herb | 0.47 | Young stems and leaves together | Vegetable | C |
| *Digera arvensis* Forssk. | Gorji soppu | Herb | 0.07 | Young stems and leaves together | Vegetable | C |
| *Gomphrena celosioides* L. | Kalluanne soppu | Herb | 0.20 | Young stems and leaves together | Vegetable | F |
| *Amaranthus caudatus* L. | Kempukeere soppu | Herb | 0.48 | Young stems and leaves together | Vegetable | C |
| *Amaranthus spinosus* L. | Mullkeere soppu | Herb | 0.07 | Young stems and leaves together | Vegetable | C/F |
| *Amaranthus paniculatus* L. | Musugukke soppu | Herb | 0.19 | Young stems and leaves together | Vegetable | F |
| *Amaranthus viridis* L. | Silkere soppu | Herb | 0.93 | Young stems and leaves together | Vegetable | C |
| *Amaranthus gangeticus* L. | Thuppa kere soppu | Herb | 0.45 | Young stems and leaves together | Vegetable | C |
| *Achyranthes aspera* L. | Uthrani soppu | Herb | 0.58 | Young stems and leaves together | Vegetable | F |
| **Anacardiaceae** | | | | | | |
| *Buchanania lanzan* Spr. | Dodda murki | Tree | 0.28 | Mature fruits | Fruit | F |
| *Semecarpus anacardium* L. | Geru | Tree | 0.14 | Mature fruits | Fruit | F |
| *Buchanania axillaris* (Desr.) Ramam | Murki | Tree | 0.08 | Mature fruits | Fruit | F |
| **Annonaceae** | | | | | | |
| *Miliusa velutina* (Dunal) J. | Hesare | Tree | 0.20 | Mature fruits | Fruit | F |
| **Apocynaceae** | | | | | | |
| *Wrightia tinctoria* R. Br. | Aale soppu | Tree | 0.01 | Young stems and leaves together | Vegetable | F |
| **Arecaceae** | | | | | | |
| *Phoenix sylvestris* Roxb. | Eechalu | Shrub | 0.37 | Mature fruits/roots | Fruit/vegetable | F |
| **Asclepiadaceae** | | | | | | |
| *Gymnema sylvestre* (Retz.) R. | Makali | Climber | 0.24 | Roots | Vegetable | F |
| *Holostemma annulare* (Roxb.) K. | Muste soppu | Climber | 0.73 | Young stems and leaves together | Vegetable | F |
| Basidiomycetes (Fungi) | | | | | | |
| *Agaricus* species (Larger body) | Dodda Anabe | Herb | 0.44 | Whole plant | Vegetable | C/F |
| *Agaricus* species (Small body) | Chicka Anabe | Herb | 0.45 | Whole plant | Vegetable | C/F |
| **Boraginaceae** | | | | | | |
| *Ehretia canarensis* (C.B. Clarke) Gamble | Chele hannu | Tree | 0.03 | Mature fruits | Fruit | F |
| *Cordia wallichii* G. Don, Gen. | Solle kudi | Tree | 0.27 | Young stems and leaves together | Vegetable | F |
| **Cactaceae** | | | | | | |
| *Opuntia dilleni* (K.G.) Haw. | Kalli | Herb | 0.08 | Mature fruits | Fruit | F |
| **Caesalpinaceae** | | | | | | |
| *Tamarindus indica* L. | Hunase | Tree | 1.00 | Young stems, leaves/young and mature fruit | Vegetable | C/F |
| *Cassia tora* L. | Sagase soppu | Climber | 0.56 | Young stems and leaves together | Vegetable | C/F |
| *Cassia auriculata* L. | Thangadi | Shrub | 0.28 | Young stems and leaves together | Vegetable | F |
| **Cappariaceae** | | | | | | |
| *Capparis sepiaria* L. | Huligotti | Climber | 0.03 | Mature fruits | Fruit | F |
| **Commelinaceae** | | | | | | |
| *Commelina diffusa* Burm. | Kanne soppu | Herb | 0.06 | Young stems and leaves together | Vegetable | C |
| **Cruciferaceae** | | | | | | |
| *Brassica rapa* L. | Sasive soppu | Herb | 1.00 | Young stems and leaves together | Vegetable | C |
| **Cucurbitaceae** | | | | | | |
| *Momordica charantia* L. | Agalkai | Climber | 0.05 | Mature fruits | Vegetable | C |
| *Cocculus hirsutus* Diels. | Kadu thonde | Climber | 0.20 | Mature fruits | Vegetable | F |
| *Cucrbita maxima* Duch. | Kumbla | Climber | 1.00 | Mature fruits | Vegetable | C |
| *Trichosanthes cucumerina* L. | Padaval kai | Climber | 0.65 | Mature fruits | Vegetable | C |
| *Cucurbita pepo* Dc. | Soore kai | Climber | 0.79 | Mature fruits | Vegetable | C |
| **Dioscoreaceae** | | | | | | |
| *Dioscorea wallichii* Hk. | Benne | Climber | 0.73 | Tubers | Vegetable | F |
| *Dioscorea oppositifolia* L. | Kalbenne | Climber | 0.30 | Tubers | Vegetable | F |
| *Dioscorea pentaphylla* L. | Noore | Climber | 0.82 | Tubers | Vegetable | F |
| **Ebanaceae** | | | | | | |
| *Diospyros montana* Roxb. | Jagalganti kudi | Tree | 0.10 | Young stems and leaves together | Vegetable | F |
| *Diospyros melanoxylon* Roxb. | Thupre | Tree | 0.10 | Mature fruits | Vegetable | F |
| **Erythroxylaceae** | | | | | | |
| *Erythroxylon monogynum* Roxb. | Chumbulse | Tree | 0.26 | Mature fruits | Fruit | F |
| **Euphorbiaceae** | | | | | | |
| *Euphorbia heyneana* Spreng. | Narbele soppu | Herb | 0.57 | Young stems and leaves together | Vegetable | C/F |
| *Phyllanthus emblica* L. | Nelli | Tree | 0.83 | Mature fruits | Vegetable | F |
| **Fabaceae** | | | | | | |
| *Indigofera tinctoria* L. | Marali kudi | Tree | 0.20 | Young stems and leaves together | Vegetable | F |
| *Lablab purpureus* L. | Nelaware | Climber | 0.92 | Mature fruits | Vegetable | C |

Appendix 1: Countinue

| Scientific name | Folk name | Habit | Use index (UI) | Parts used | Usage | Occurrence |
|---|---|---|---|---|---|---|
| *Pterolobium hexapetalum* (Roth) S. and W. | Sundrase | Climber | 0.10 | Mature fruits | Fruit | F |
| **Flacourtaceae** | | | | | | |
| *Scolopia crenata* (W. and A.) Clos. | Doddgejjalike | Tree | 0.19 | Mature fruits | Fruit | F |
| *Flacourtia indica* (Burn.) Merr. | Gejjalike | Tree | 0.11 | Mature fruit | Fruit | F |
| **Menispermaceae** | | | | | | |
| *Cissampelos pareira* L. | Ambuthotti | Climber | 0.05 | Mature fruits | Fruit | F |
| *Basell alba* L. | Basale soppu | Climber | 0.90 | Young stems and leaves together | Vegetable | C |
| *Cocculus hirsutus* (L.) Diels | Javne soppu | Herb | 0.16 | Young stems and leaves together | Vegetable | C/F |
| *Anredera vesicaria*(Lam.) C.F. Gaertn | Kadu basale | Climber | 0.05 | Young stems and leaves together | Vegetable | F |
| **Mimosaceae** | | | | | | |
| *Acacia farnesiana* (L.) Willd. | Seege soppu | Shrub | 0.74 | Young stems and leaves together | Vegetable | F |
| **Moraceae** | | | | | | |
| *Ficus glomerata* Roxb. | Hathi | Tree | 0.02 | Mature fruits | Fruit | F |
| **Moringaceae** | | | | | | |
| *Moringa concanensis* Nimmo | Kadunugge soppu | Tree | 0.16 | Young stems and leaves together | Vegetable | F |
| *Moringa olefera* Lam. | Nugge soppu | Tree | 1.00 | Young stems and leaves together | Vegetable | C |
| **Myrtaceae** | | | | | | |
| *Syzizium cumini* (L.) Skeels | Nerale | Tree | 0.36 | Mature fruits | Fruit | F |
| **Nyctaginaceae** | | | | | | |
| *Boerhavia diffusa* L. | Avane soppu | Herb | 0.56 | Young stems and leaves together | Vegetable | C/F |
| *Boerhavia repanda* Willd. | Katte soppu | Herb | 0.47 | Young stems and leaves together | Vegetable | C/F |
| **Oleaceae** | | | | | | |
| *Jasminum trichotomum*Heyne ex Roth. | Kaddi soppu | Shrub | 1.00 | Young stems and leaves together | Vegetable | F |
| *Carissa carandas* L. | Kevali | Shrub | 0.40 | Mature fruits | Fruit | F |
| **Poaceae** | | | | | | |
| *Bambusa arundinacea* Retz. | Bamboo | Tree | 0.76 | Shoot | Vegetable | F |
| *Dendrocalamus strictus* (Roxb) Nees | Chit bidaru | Tree | 0.94 | Shoot | Vegetable | F |
| **Rhamnaceae** | | | | | | |
| *Zizyphus rugosa* Lam. | Elachi | Tree | 0.75 | Mature fruits | Fruit | F |
| *Zizyphus xylopyrus* Willd. | Gotti | Shrub | 0.04 | Mature fruits | Fruit | F |
| *Zizyphus oenoplia* Miller. | Sodli | Climber | 0.29 | Mature fruits | Fruit | F |
| **Rubiaceae** | | | | | | |
| *Canthium parviflorum* Lam. | Kare soppu | Shrub | 1.00 | Young stems and leaves together | Vegetable | F |
| *Pavetta indica* L. | Pavatige | Tree | 0.25 | Mature fruits | Fruit | F |
| **Rutaceae** | | | | | | |
| *Feronia elephantum* Corr. | Byala | Tree | 0.06 | Mature fruits | Fruit | F |
| *Murraya coinigi* Spr. | Curry leaves | Tree | 1.00 | Mature leaves | Vegetable | C/F |
| *Citrus reticulata* Blanco. | Kadu kithale | Tree | 0.37 | Young and mature fruit | vegetable/Fruit | F |
| *Toddalia asiatica* (L.) Lam. | Kadumensau kudi | Climber | 0.16 | Young stems and leaves together | Vegetable | F |
| **Salvadoraceae** | | | | | | |
| *Azima tetracantha* Lam. | Batsodli | Climber | 0.15 | Mature fruits | Fruit | F |
| **Sapinadaceae** | | | | | | |
| *Dimocarpus longan* Lour. | Gudagan jagadi | Tree | 0.17 | Mature fruits | Fruit | F |
| *Schleischera oleosa* (Lour.) Oken. | Hulijagadi | Tree | 0.12 | Mature fruits | Fruit | F |
| **Sapotaceae** | | | | | | |
| *Mimusops elengi* L. | Pokla | Tree | 0.13 | Mature fruits | Fruit | F |
| **Scrophulariaceae** | | | | | | |
| *Bacopa monnieri* (L.) Wettst. | Goni soppu | Herb | 0.07 | Young stems and leaves together | Vegetable | C/F |
| **Solanaceae** | | | | | | |
| *Solanum melongena* L. | Brinjal | Herb | 1.00 | Mature fruits | Vegetable | C |
| *Capsicum annuum* L. | Chilly | Herb | 1.00 | Mature fruits | Vegetable | C |
| *Solanum nigrum* L. | Ganake soppu | Herb | 1.00 | Young stems and leaves together | Vegetable | C |
| *Lycopersican esculentum* Mill. Var. | Gul tamate | Herb | 0.72 | Mature fruits | Vegetable | C/F |
| *Solanum xanthocarpum* Sch. and Wendl. | Gulkai | Shrub | 0.61 | Mature fruits | Vegetable | C/F |
| *Solanum torvum* Sw., Prodr. | Kai sunde | Shrub | 0.08 | Mature fruits | Vegetable | C/F |
| *Solanum khasianum* C.B. Clarke in J. | Mullu sunde | Shrub | 0.10 | Mature fruits | Vegetable | C/F |
| *Solanum erianthum* D. | Paraval sunde | Shrub | 0.10 | Mature fruits | Vegetable | C/F |
| Solanum anguivi Lam. | Sunde kai | Shrub | 0.98 | Mature fruits | Vegetable | F |
| *Lycopersican esculentum* Mill. | Tomato | Herb | 1.00 | Mature fruits | Vegetable | C |
| **Tiliaceae** | | | | | | |
| *Grewia tiliaefolia* Vahl. | Thadasalu fruit | Tree | 0.26 | Mature fruits | Fruit | F |
| **Verbinaceae** | | | | | | |
| *Premna tomentosa* Willd. | Easy kudi | Tree | 0.01 | Young stems and leaves together | Vegetable | F |
| **Vitaceae** | | | | | | |
| *Vitis qudrangularis* Wall. | Mangarballi kudi | Climber | 0.31 | Young stems and leaves together | Vegetable | F |
| **Zygophyllaceae** | | | | | | |
| *Tribulus terrestris* L. | Naggalu kudi | Herb | 0.30 | Young stems and leaves together | Vegetable | F |

F: Forest land, C: Cultivated land

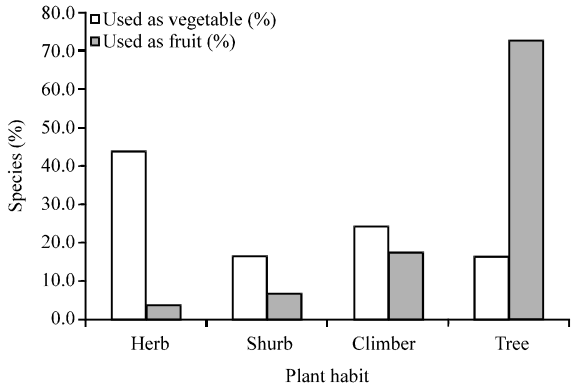


Fig. 3: Percentage of species used from each category of plant habit

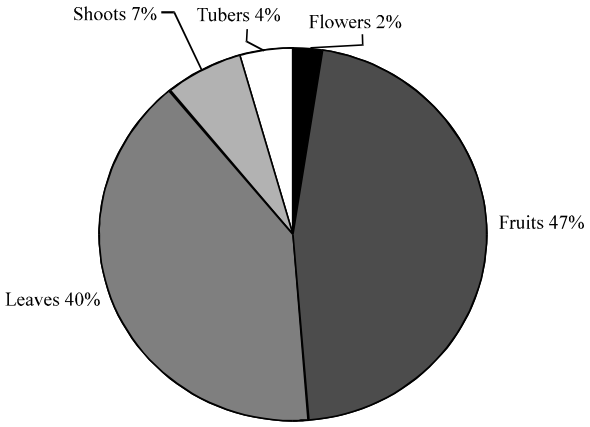


Fig. 4: Percentage of plant parts used for food

**Frequency of usage and seasonality of wild vegetables:** A total of 64 species are used by these communities as vegetables. Species such as *Celosia argentea* (Amaranthaceae), *Solanum anguivi* (Solanaceae) are collected from farm land, where as *Jasminum trichotomum* (Oleaceae) is collected from the forests (Appendix 1). A mixture of 8-10 species (*Toddalia asiatica*, *Cassia auriculata*, *Indigofera tinctoria*, *Cordia wallichii*, *Diospyros montana*, *Commelina diffusa*, *Boerhavia diffusa*, *Euphorbia heyneana*, *Amaranthus viridis* and *Alternanthera sessilis*) is used as vegetables for preparing sambar and side dish along with the meal. The 10 most frequently used wild vegetable species, are based on the data obtained from open ended questionnaire with local people are listed in Table 2. Most of the wild vegetables displayed distinct seasonal patterns. The 75 species out of 92 that are used as vegetables are found during rainy season (from May to November). Highest

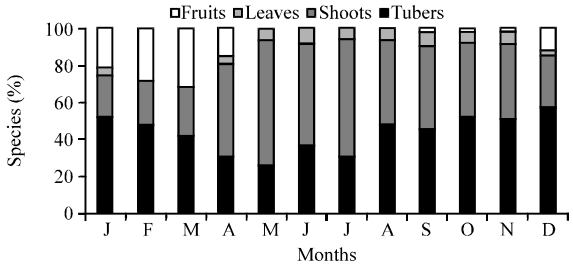


Fig. 5: Availability calendar for wild vegetable used by forest dependent community

Table 1: Commodity groups of useful plants in MM hills

| Commodity group | No. of plant species | Percent/total (%) |
|---|---|---|
| Wild vegetables | 92 | 41.6 |
| Medicine | 68 | 30.8 |
| Sacred | 16 | 7.2 |
| Household and agriculture implements | 45 | 20.4 |

number of wild fruits and leafy vegetables are available in the month of August and are lowest in the month of March (Fig. 5).

**Importance of wild plants for the forest dependent community:** The Use Index (UI) varies widely (Appendix 1), from 0.01 to 1.0; the UI value indicates the number of households actually used a particular plant species. For instances, *Premna tomentosa* (0.1) and *Wrightia tinctoria* (0.1) where only 1% of the sampled households use them. Other plants such as *Celosia argentea* (1.0) *Jasminum trichotomum* (1.0) where all the sample households are used every alternative day, until the season gets over. Plant species those who have a UI higher than 0.9 as do some leafy wild vegetables such as *Celosia argentea* (Amaranthaceae), *Jasminum trichotomum* (Oleaceae), *Solanum nigrum* and *Solanum anguivi* (Solanaceae) have are important as onion, garlic, chili etc., (Table 3). Wild vegetables such as *Solanum anguivi*, *Celosia argentea*, which have high UI, are abundantly found throughout the year. However, species such as *Premna tomentosa* and *Wrightia tinctoria*have low UI which are available only during the spring season.

## DISCUSSION

**Knowledge on wild vegetables use:** Knowledge of using wild vegetables has been traditionally passed on for generations from time to time. There is no significant difference in knowledge of using WEPs between two

Table 2: Frequently used top 10 wild vegetable species

| Botanical name | Local name | Frequency | Season | Part used |
|---|---|---|---|---|
| Mixed leafy vegetables | Berake soppu | Once in 3 days | All months | Whole plant |
| *Celosia argentea* L. | Anne soppu | Once in 4 days | Apr-Jan | Whole plant |
| *Amaranthus viridis* L. | Silkeere soppu | Once in 4 days | May-Feb. | Whole plant |
| *Solanum anguivi* Lam. | Ganake soppu | Once in 5 days | Apr-Nov | Whole plant |
| *Jasminum ritchiei Cl.* | Kaddi soppu | Once in 5 days | April-Nov | Leaves |
| *Holostemma annulare* (Roxb.) K. | Muste soppu | Once in 6 days | May-Nov | Leaves |
| *Solanum torvum* Sw. | Sunde kai | Once in 6 days | July-Jan | Fruits |
| *Capsicum annum* L. | Menasina kai | Once in 4 days | All months | Fruits |
| *Murraya coinigi* L. | Karibevu | Once in 3 days | All months | Leaves |
| *Solanum nigrum* L. | Gulakai | Once in 6 days | All months | Fruits |

Table 3: Important wild vegetables and their use index (UI)

| Scientific name | Family | Use index* |
|---|---|---|
| *Celosia argentea* L. | Amaranthaceae | 1.00 |
| *Jasminum ritchiei Cl.* | Oleaceae | 1.00 |
| *Canthium parviflorum* Lam. | Rubiaceae | 1.00 |
| *Solanum nigrum* L. | Solanaceae | 1.00 |
| *Solanum anguivi* Lam. | Solanaceae | 0.98 |
| *Dendrocalamus strictus* (Roxb) Nees | Poaceae | 0.96 |
| *Amaranthus viridis* L. | Amaranthaceae | 0.93 |
| Mixed species | Mixed | 0.93 |
| *Dioscorea pentaphylla* L. | Dioscoreaceae | 0.82 |
| *Acacia farnesiana* (L.) Willd. | Mimosaceae | 0.74 |
| *Bambos arundinacea* Retz. | Poaceae | 0.74 |
| *Holostemma annulare* (Roxb.) K. | Asclepiadaceae | 0.73 |
| *Solanum xanthocarpum* L. | Solanaceae | 0.60 |
| *Cassia tora* L. | Caesalpinaceae | 0.56 |

De Laucena *et al.* (2007), Does the local availability of woody *Caatinga* plants (Northeastern Brazil) explain their use value? Economic Botany., 61: 347-361, Phillips and Gentry (1993). The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. Economic Botany., 47: 15-32

communities. Old age people have more knowledge on the use of WEPs than young people. Similarly, women have more knowledge on leafy vegetables than men, visa versa in wild fruits. Similar findings are found in many studies across the globe (Ayyanar and Ignacimuthu, 2005; Dovie *et al*., 2007; Pieroni, 2001). The knowledge of using wild plant resources was critical for the older generation for survival while it is not so in the present younger generation since their food habit and life style has been changing very rapidly (Jain, 1991). Several studies across the globe revealed and discussed the importance of such knowledge in scientific studies (Donovan and Puri, 2004; Eyong, 2007).

**Seasonality of wild vegetables:** The usage of wild plants was related to seasonal plant availability and their phenological status (Harisha, 2011). Rural communities consume more tubers in summer (Rashid *et al*., 2008), procure more fruits and leafy vegetables during rainy season (Acharya and Acharya, 2010). The women who gather most of the wild vegetables from both the communities were able to predict which species and which part is available in which season. While the dependence on fruits and leaves is more during the rainy season, the communities depend on tubers during the dry season. Further, the communities also seem to know where to collect a particular species. The communities are able to predict the availability of wild vegetables with respect to the micro-climatic requirements (Jain, 1991). Despite the changing lifestyles, both the communities use a wide variety of WEPs in their food. Knowledge on sesonal availability, processing and preparation of recipes are gained from practical experience and most of the time passed on to next generation from their ancestor.

**Foods security of forest dependent community:** Wild vegetables can be procured fresh every day from the forest or the cultivated land. Gathering wild vegetable is often cost effective both with respect to the amount and time spent. Therefore local community prefers to procure vegetable from the wild than purchasing from the shops which are often far from the village. Economic condition of the household and time requires procuring WEPs which are the deciding factor in poor rural households. These factors are well studied in Nepal (Acharya and Acharya, 2010), in South Africa (Dovie *et al*., 2007). Community consumes wild leafy vegetables and fruits in rainy season when there is an acute shortage of agriculture produce.

Farm land and fallow lands are rich source of leafy vegetables which are collected when they go to work in farm land. Community people collect wild vegetables from forest when they go for grazing, fuel wood collection or while being employed by the forest department. Landless households depend more on forest for wild vegetables than land holding households in rainy season. However, in summer landless households are depending more on local market for vegetables than landholding households. The wild vegetables also substitute food crops such as finger millet (*Eleusine coracana*) and Hyacinth bean (*Dolichos lablab*) during extremes droughts. Therefore, wild vegetables form an important component for their survival (Dovie *et al*., 2007).

## CONCLUSION

Wild plants form an important source of food for forest dependent community in MM Hills. Till date there

has been no systematic study about the wild edibles consumed by local communities in this area. Therefore an attempt has been made here to catalogue the local knowledge of WEPs used by the Soligas and Lingayat communities in MM Hills. Both the communities possess rich knowledge on the usage of plants for food which were evident in the number of species and the plant parts used. This study contributes significantly to the database of traditional indigenous knowledge of plants of the country, which have not been documented earlier. The findings suggest further investigation into nutritional profiles, cultural values, processing methods, cultivation techniques and conservational studies of the reported plant species.

## ACKNOWLEDGMENTS

The authors would like to thank the communities for freely sharing the traditional knowledge with us. We would also like to thank Dr. Ravikanth G., Dr. Aravind NA, Dr. Ramesh Kannan, Dr. R. Ganesan and Mr. Senthil Kumar for their help in the identification of the samples. The authors thank Soliga and Lingayat commnity, Mr. Madesha, Mr. Narayanan, Ms. Sheela, Mr. Thamme Gowda and Ms. Madevamma for help in the collection of data. Permission of the Karnataka Forest Department (KFD) is greatly acknowledged.

## REFERENCES

Acharya, K.P. and R. Acharya, 2010. Eating from the wild: Indigenous knowledge on wild edible plants in Parroha VDC of Rupandehi district, Central Nepal. Int. J. Sci., 3: 28-48.

Aravind, N.A., D. Rao, K.N. Ganeshiah, U. Shaankar and J.G. Poulsens, 2010. Impact of the invasive plant, Lantana camara, on bird assemblages at Male Mahadeshwara Reserve Forest, South India. Trop. Ecol., 51: 325-338.

Ayyanar, M. and S. Ignacimuthu, 2005. Traditional knowledge of Kani tribals in Kouthalai of Tirunelveli hills, Tamil Nadu, India. J. Ethnopharmacol., 102: 246-255.

Bhattarai, S., R.P. Chaudhary and R.S.L. Taylor, 2009. Wild edible plants used by the people of Manang district, Central Nepal. Ecol. Food Nutr., 48: 1-20.

Bussmann R.W., 2006. Ethnobotany of the Samburu of Mt. Nyiru, South Turkana, Kenya. J. Ethnobiol. Ethnomed., Vol. 2. 10.1186/1746-4269-2-35

De Laucena, R.F.P, E. de Lima Araujo and U.P. De Albuquerque, 2007. Does the local availability of woody *Caatinga* plants (Northeastern Brazil) explain their use value? Econ. Bot., 61: 347-361.

Donovan, D. and R. Puri, 2004. Learning from traditional knowledge of non-timber forest products: Penan Benalui and the autecology of *Aquilaria* in Indonesian Borneo. Ecol. Soc., Vol. 9.

Dovie, D.B.K., C.M. Shackleton and E.T.F. Witkowski, 2007. Conceptualizing the human use of wild edible herbs for conservation in South African communal areas. J. Environ. Manage., 84: 146-156.

Eyong, C.T., 2007. Indigenous Knowledge and Sustainable Development in Africa: Case Study on Central Africa. In: Indigenous Knowledge Systems and Sustainable Development: Relevance for Africa, Boon, E.K. and L. Hens (Eds.). Kamla-Raj Enterprises, India, pp: 121-139.

Gamble, J.S., 1957. Flora of the Presidency of Madras. Botanical Survey of India, Calcutta.

Ghosh, A., 2003. Herbal folk remedies of Bankura and Medinipur districts, West Bengal (India). Ind. J. Trad. Knowledge, 2: 393-396.

Grover, J.K., S. Yadav and V. Vats, 2002. Medicinal plants of India with anti-diabetic potential. J. Ethnopharmacol., 81: 81-100.

Handa, S.S., 1998. Indian efforts on standardization and quality control of medicinal plants using scientific parameters. Amruth, 2: 10-10.

Harisha, R.P., 2011. Livelihood and potential conservation roles of wild edible herbs. Int. Soc. Ethnobiol. Newslett., Vol. 3.

Harisha, R.P., 2012. Present scenario of user knowledge and availability of Wild Edible Plants in Male Mahadehswara Hills, South India. Int. Soc. Ethnopharmacol. Newsletter, 4: 10-12.

Heywood, V., 1999. Use and Potential of Wild Plants in Farm Households. FAO, Rome, pp: 113.

Jain, S.K., 1991. Dictionary of Indian Folk Medicine and Ethnobotany. Deep Publications, New Delhi.

KFD, 2000. Kollegal forestdivision management plan 2000. Karnataka Forest Deaprtment (KFD), India.

Lambert, J., J. Srivastava and N. Vietmeyer, 1997. Medicinal Plants: Rescuing a Global Heritage. World Bank Publications, Washington, DC., USA., ISBN-13: 9780821338568, Pages: 61.

Murali, K.S, R.S. Setty, K.N. Ganeshaiah and U.R. Shaanker, 1998. Does forest type classificationn reflect spatial dynamics of vegetation? An Analysis using GIS techniques. Current Sci., 75: 220-227.

Phillips, O. and A.H. Gentry, 1993. The useful plants of Tambopata, Peru: I. Statistical hypotheses tests with a new quantitative technique. Econ. Bot., 47: 15-32.

Pieroni, A., 2001. Evaluation of the cultural significance of wild food botanicals traditionally consumed in Northwestern Tuscany, Italy. J. Ethnobiol., 21: 89-104.

Rashid, A., V.K. Anand and J. Serwar, 2008. Less known WEPs used by the Gujjar tribe of District Rajouri, Jammu and Kashmir state-India. Int. J. Bot., 4: 219-224.

Saldanha, C.J. and D.H. Nicholson, 1976. The Flora of Hassan District. Karnataka, Amerind Publishing Co. Pvt. Ltd., New Delhi, India.

Scoones, I., M. Melnyk and J.N. Pretty, 1992. The Hidden Harvest-Wild Foods and Agricultural Systems: A Literature Review and Annotated Bibliography. Sustainable Agriculture Programme, International Institute for Environment and Development, London, ISBN-13: 978-0905347936, Pages: 256.

Shaanker, U.R, K.N. Ganeshaiah, S. Krishnan, R. Ramya and C. Meera *et al*., 2004. Livelihood gains and ecological costs of non-timber forest product dependence: Assessing the roles of dependence, ecological knowledge and market structure in three contrasting human and ecological settings in south India. Environ. Conserv., 31: 242-253.

Sheldon, J.W., M.J. Balick and S.A. Laird, 1997. Medicinal plants: Can utilization and conservation coexist ? Adv. Econ. Bot., 12: 1-104.