Ethnomedicinal knowledge among the Malayali tribal of Chitteri hills, Eastern Ghats, Tamil Nadu, India

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ABSTRACT

The present study was aimed to document the ethnomedicinal knowledge among the Malayali tribal of Chitteri hills Eastern Ghats of Tamil Nadu, India. Field visits were made to the Chitteri hills every month covering all seasons. Interviews with traditional healers and other knowledgeable inhabitants and farmers were conducted. The Malayali tribal people of Chitteri hills use 320 plant species for their day-to-day life, this ethnomedical exploration revealed they were the habit of using around 216 species of medicinal plants belonging to 200 genera under 46 families. Malayali tribes use morphological characters such as bark surface, leaf colour, leaf taste and exudates, underground plant parts and ecology of species as criteria for identification of 135 species belongs to 105 genera under 46 families. The documentation of the knowledge of Malayali tribal identification of plants of Chitteri hills is to be accorded top priority in the preservation of our ancient traditional knowledge.

KEYWORDS: Ethnobotany, Chitteri, Tamil Nadu, Eastern Ghats and Malayali

INTRODUCTION

Traditional knowledge of taxonomy is developed from a basic human tendency to recognize plants that are imposed by nature. It is developed from the unique history and culturally defined beliefs, behaviors and preferences of particular traditional societies rooted in a clearly defined geographical area and transmit their knowledge to their offspring's. The universal identification of plants had been ubiquitous since the evolution of systematic botany. Evolution of taxonomy triggered botanists, to explore variety of plant species universally on their biological properties and evolved into the present modern ethnobotany, which emphasize on their, growth pattern and chemical compositions in traditional communities need. With the passage of time, they have developed a great deal of knowledge on the use of plants and plant products. The tribal have their own scientific knowledge of technology and they are still considered to be primitive and traditional bounded. The knowledge is very dynamic and is strongly influenced by indigenous creativity, innovation, rooted in geographical and cultural cognition. The knowledge is very vulnerable to degradation and even complete loss. In this perspective a rich diversity of flora of Chitteri hills was chosen for the study to document with objectives to reveal the criteria used by the Malayali of Chitteri hills use morphological characters and ecology of species as criteria for identification.

MATERIALS & METHODS

Study Area

The present study area, Chitteri hills, a part of Southern Eastern Ghats, is situated in Pappireddipatti revenue taluk of Dharmapuri district in Tamil Nadu, India. Dharmapuri district has the second highest forest cover in relation to the total geographical area, satisfying the criterion of optimum forest cover of 23.62% in its geographical area. The district accounts for 14.3% of the total forest area of the Tamil Nadu.

Chitteri is situated towards North East of Salem district within the geographical limit of 78°15’-78°45’ E, longitude and 11°44’-12°08’N, latitude (Figure-1) and occupies an area of about 654.22 Km². Chitteri hills form a compact block consisting of several hill ranges and contain tangled ridges and ravines running in the Northeast and Southwest directions, enclosing many narrow valleys, rivers such as Kallar, Varattar, Kambalai, Anaaimaduvu, Kovilar, Sholaiyar and Pungamaduvu rivers and their tributaries drain the area. These rivers are ephemeral in

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nature and structurally controlled in their flow. The mean maximum and minimum annual temperatures of the study area are 39.5°C and 19°C, and 31°C and 18°C respectively in winter, average rainfall ranges from 800-1000mm (Harur Forest Office Report, 2007). The Malayali tribes are the most and dominant significant tribes in Chitteri hills of Tamil Nadu. Malayali are the largest Scheduled Tribe constituting 47% of the state scheduled tribal population with a population of 11,482 (Census, 2011). There are 60 villages, out of these, 6 villages are located in plains and 54 villages are located in hill tops.

Field Visits

Field visits were made to the Chitteri hills every month covering all seasons during the period October 2009 – March 2013. Interview and data gathering methods were followed by (Schultes, 1962; Jain, 1995; Rao & Hajra, 1987) Interviews with traditional healers and other knowledgeable inhabitants and farmers were conducted in order to understand how Malayali tribes identify and utilize plants. In addition, we consulted the who is familiar with the study area. Voucher specimens were collected for the purpose of identification and deposited at Vivekanandha College of Arts and Sciences for Women herbarium.

Documentation of Ethnoidentification of Plants

Knowledge

The respondents or informants have been selected for the study based on the following criteria, prevalence of ethnobotanical knowledge in villages and willingness of respondents to share the knowledge. All the respondents are men belong to 25 to 85yrs of age group. Most of the respondents are illiterate or even never crossed primary education.

Data were collected from the tribes using two different methods: 1) The knowledgeable informants are taken to the field and collection of plants specimens with uses of the plants and 2) The other way is to collect all plants available in the village, show them to these informants one by one, and record the information about them. The data were gathered in a series of questionnaire, structured, semi-structured and unstructured interviews regarding plant uses, identification during several field trips. Random interviews with a different sub sect of tribal were used to verify data already collected regarding indigenous knowledge for identification of plant species of Malayali tribes of Chitteri hills was documented.

RESULTS AND DISCUSSION

Periodical trips were made to the study area covering all the hamlets in the hills. Such frequent visits to tribal hamlets helped us to establish a good rapport with the natives, which aided us in the collection day today life. Much patience was needed for gathering information from tribes. Only after successive visits the native divulge their knowledge of plants, especially used for medicine and identification. A cordial relationship was established with them and they feel quite at ease in our company.

Most of the tribes are illiterate and this rules out the possibility of using questionnaires as means of collecting data, though we prepared questionnaires for ethno medicinal plants and traditional knowledge. Dialogues, conversations and subsequent recording of data are made. The authenticity of the information gathered is verified subsequent field trips to other areas with other persons. Such trips helped in verifying the validity of the other related uses. From such field visits, we recorded that Malayali tribal people of Chitteri hills are in the habit of using 320 species for their day today life.

Enumeration of Ethnobotanical Plants

The present ethnobotanical exploration revealed that the Malayali tribal people of Chitteri hills are in the habit of using around 216 species of medicinal plants belonging to 200 genera under 45 families. The families were named as per APG-III classification 2009.

The Malayali tribes of Chitteri hills prefer to use species from their native forest and species from surrounding areas. Among the plants used by them Apocynaceae topping the list with 37 species, Fabaceae (29 species), Acanthaceae and Rutaceae each listed with 16 species. Based on the habit, ethno medicinal plants of Chitteri hills fall under various categories such as trees, shrubs, herbs, climbers and lianas. Among them, trees and herbaceous growth forms dominate over other growth forms.

Identification of Plants by Tribal

Morphological characters

The Malayali tribes use morphological characters and ecology of species as criteria for identification of 135 species (Voucher specimen number from Vi-432 to Vi-567) belongs to 105 genera under 46 families. Morphological characters are often used to recognize plants of which vegetative features are more commonly used than floral features. Malayali tribes also identify plants based on morphological characters with other associated characters such as taste, colour, succulence of leaves and exudates.

Bark characters

The term bark denotes the tissues outside the vascular cambium of the axis, in either a primary or secondary state of growth. In botanical sense bark is that layer of tissue accumulated on the surface of the plant axis as a result of the activity of the phellogen. Bark is an outwardly visible and prominent macro character especially in trees. Malayali use bark characters as the main criterion for identifying tree species with other characters such as nature and colour of leaf and presence or absence of glands as supportive characters.

Bark features such as nature of the surface, thickness of bark and exudates are used by the Malayali as criteria for identification. Among the species, studied Malayali tribal classified 97 species based on bark features without ambiguity (Table 1).
Table 1: Identification of plants with bark characters in Chitteri hills by Malayali tribes

| S. No. | Botanical Name | Family | Local name | Bark Characters |
|--------|----------------|--------|------------|-----------------|
| 1.     | Acacia leucophloea (Roxb.) Willd. | Fabaceae | Velvelam/Velamaram | Smooth Bark |
| 2.     | Alangium salviolium (L.f) Wang. | Alangiaceae | Azhingi | Rough Bark |
| 3.     | Albizia amara | Fabaceae | Unzai | Flaked Bark |
| 4.     | Albizia chinensis (Osbeck.) Merr. | Fabaceae | Selavengi | Rough Bark |
| 5.     | Albizia lebebeck (L.) Wild. | Fabaceae | Pattaasilai/Vagai | Rough Bark |
| 6.     | Albizia procera | Fabaceae | Kudumaduramaram | Smooth & Thick Bark |
| 7.     | Anacardium occidentale L. | Anacardiaceae | Mundhiri | Rough Bark |
| 8.     | Anogeissus latifolia (Roxb. ex DC.) Wall. ex Gill. & Perr. | Combretaceae | Namaimaram | Flaked & Thick Bark |
| 9.     | Arctocarpus heterophyllus Lam. | Moraceae | Palamaram | Rough Bark |
| 10.    | Atalantia monophylla (L.) DC. | Rutaceae | Kaatuعلmichi | Prickled Bark |
| 11.    | Bauhinia tomentosa | Fabaceae | Aacharam/Pathinimaram | Rough Bark |
| 12.    | Bombax ceiba | Bombacaceae | Ilavu | Prickled Bark |
| 13.    | Bridelia crenulataRoxb.Buchanania axillaris (Desr.) T.P. Ramamoorthyinc.J.Saldanha& Nicolson | Anacardiaceae | Sulluki/Sararappumaram | Rough and Segmented bark |
| 14.    | Canthium dicoccum (Gaertn.) Tejisma & Binn. | Rubiaceae | Nekkini | Rough Bark |
| 15.    | Capparis zeylanica | Fabaceae | Athandai | Prickled Bark |
| 16.    | Cassia fistula L. | Fabaceae | Konnai/Sarakonkai | Smooth & Thick Bark |
| 17.    | Cassia siamea Lam. | Fabaceae | Thagaramaram | Smooth Bark |
| 18.    | Ceiba pentandra (L.) Gaertn. | Bombacaceae | Ilavu | Prickled Bark |
| 19.    | Chloroxylon swietenia DC. | Rutaceae | Purasaram | Rough Bark |
| 20.    | Chukrasia tabularis A. Juss. | Meliaceae | Magombumaram | Rough Bark |
| 21.    | Cleistanthus collinus (Roxb.) Hook.f. | Euphorbiaceae | Oduvanthazhai | Rough Bark |
| 22.    | Commiphora caudata (Wight. & Arnn.) Engl. | Buseraceae | Pachakulivai | Smooth & Flaked Bark |
| 23.    | Cordia obliquaWilld. | Boraginaceae | Vallukaram | Rough Bark |
| 24.    | Cordia wullschlii G. Don. | Fabaceae | Panthekku | Rough Bark |
| 25.    | Dalbergia lancoetaria L. | Fabaceae | Eetimaram | Rough Bark |
| 26.    | Dalbergia latifoliaRoxb. | Fabaceae | Eetimaram | Rough & Thick Bark |
| 27.    | Diospyros ebenum J. Koen. ex Retz | Ebenaceae | Karungali | Rough-Hand Segmented bark |
| 28.    | Diospyros ferrnea (Willd.) Bakh. | Ebenaceae | Irumbuli | Rough Bark |
| 29.    | Diospyros melanoxylonRoxb. | Ebenaceae | Thumbaaramaram | Rough and Segmented bark |
| 30.    | Diospyros montanaRoxb. | Ebenaceae | Vellunumaram | Prickled Bark |
| 31.    | Diospyros oviformia Wight. | Ebenaceae | Kari maram | Rough Bark |
| 32.    | Erythroxylum monogynumRoxb. | Erythroxylaceae | Sembiluca/Devadhau | Flaked Bark |
| 33.    | Eucalyptus tereticornis Smith | Myrtaceae | Thailaram | Flaked Bark |
| 34.    | Ficus racemosa L. | Moraceae | Athimaram | Thick Bark |
| 35.    | Ficus benghalensis L. | Moraceae | Aalamaram | Smooth Bark |
| 36.    | Ficus microcarpa L. | Moraceae | Kalichi | Smooth Bark |
| 37.    | Ficus racemosa L. | Moraceae | Athi | Smooth Bark |
| 38.    | Ficus religiosa L. | Moraceae | Arasaram | Smooth Bark |
| 39.    | Ficus virensAit. | Moraceae | Irall/Marachi | Smooth Bark |
| 40.    | Ficus virensAit. | Moraceae | Irall/Marachi | Smooth Bark |
| 41.    | Fliciicum decipiens (Wight. & Arnn.) Thwaites | Sapindaceae | Jannimaram | Smooth Bark |
| 42.    | Gardenia gymnifera L.f. | Rubiaceae | Kambumaram | Thick Bark |
| 43.    | Glycyrhiza glabra L. | Fabaceae | Athimaduram | Smooth Bark |
| 44.    | Gmelina arboreaRoxb. | Lamiaceae | Kumizhamaram | Rough Bark |
| 45.    | Grevillea robusta A. Cunn. ex R. Br. | Proteaceae | Silver rook | Rough Bark |
| 46.    | Gyropus americanusJacq. | Hernandiaceae | Thanku | Smooth Bark |
| 47.    | Ixora pavettaAndr. | Rubiaceae | Koraamaram | Rough Bark |
| 48.    | Lanea coromandelica (Houtt.) Merr. | Anacardiaceae | Kullumathi/Ohdiyamaram | Smooth & Thick Bark |
| 49.    | Ligustrum perrottetia/A.DC.ex DC. | Oleaceae | Pasaram | Smooth Bark |
| 50.    | Limonia acidissima L. | Rutaceae | Vila | Prickled Bark |
| 51.    | Madhuca longifolia (L.) Machr. | Sapotaceae | Kaatuiluppi | Rough Bark |
| 52.    | Mallotus philippensis (Lam.) Muell. Arg. | Euphorbiaceae | Thiruchilaimaram | Rough Bark |
| 53.    | Mangifera indica L. | Anacardiaceae | Manaram | Rough Bark |
| 54.    | Memecylon eduleRoxb. | Melastomataceae | Allanaram | Rough and Segmented bark |
| 55.    | Mimosa senegel L. | Sapotaceae | Mulliva/Magizhamaram | Rough Bark |
| 56.    | Mitragyna parvifolia (Roxb.) Korth. | Rubiaceae | Neerkadampa | Flaked Bark |
| 57.    | Morinda cordifoliaBuch. Ham. | Rubiaceae | Nunaramaram | Rough-Hand Segmented bark |
| 58.    | Naringi crenulata (Roxb.) Nicolson | Rutaceae | Naivila/Porvillangaram | Rough Bark |
| 59.    | Nothopegia colebrookeana (Wight.) Blume | Anacardiaceae | Kuttumathi/Kuttama | Rough & Thick Bark |
| 60.    | Phyllanthus semilic L. | Phyllanthaceae | Periyanelli | Smooth Bark |
| 61.    | Pithecellobium dulce (Roxb) Benth. | Fabaceae | Konakai/Kodukkaipuli | Rough Bark |
| 62.    | Pittosporum apaulense (DC.) Rehder&E.H.Wilson | Pittosporaceae | Vellaimathi | Smooth Bark |
| 63.    | Pleurostoma opposita (Wall.) Alston | Celastraceae | Sutholingi | Rough Bark |
| 64.    | Plumeria rubra L. | Apocynaceae | Arali | Smooth Bark |
| 65.    | Polyalthia cerasoides (Roxb.) Bedd. | Annonaceae | Senthalamaram | Rough and Segmented bark |

(Contd...)
Rough bark, rough segmented bark, smooth bark, prickled bark, fissured bark and flaked bark are the six different types of bark surfaces recognized by the Malayali in the tree species of Chitteri hills. The trees recorded in the study possess Rough bark and belongs to 50 species, 42 genera under 38 families. The tree possess Smooth bark belongs to 26 species, 23 genera under 17 families. The rough and segmented bark reported in 7 tree species belong to 5 genera under 5 families. The Prickled bark is reported in 6 tree species. The Flaked bark reported in 8 species belongs to 8 genera. Malayali identify 25 milky and white latex yielding plants belonging to 17 families. The diversity of habit of these trees that possess thick bark and. They also identify2 species with colourless latex yielding plants, 5 species are reported with red exudates yielding plants. Eight species reported as gum yielding plants and 5 species are resin yielding plants.

Bark has been used as a means of recognition of trees by many tribal societies across the world. For example, the tribes in West Africa classified *Adansonia digitata* L. the Baobab tree into the following four types using bark character such as colour and surface of bark: 1.) Smooth pink bark, 2.) Rough grey bark, 3.) Smooth grey bark and 4.) Black bark (Assogbadjo et al., 2006). Batoros and Bakigas in Western Uganda recognize trees based on life forms. Identifying trees by their architecture is no problem for them (Kakudidi, 2004).

Modern day field-botanists tend to use vegetative features such as bark characters, leaf characters, overall branching pattern and life form for on-the-spot identification of trees. The above mentioned a few publications in which this approach has been standardized.

**Plant Exudates**

The secretory spaces in the form of cavities or canals are formed by schizogeny or by lysigeny or sometimes by both phenomena combined. Laticifers are cells or series of fused cells containing fluid called latex and forming systems that permeate various tissues of the plant body.

Any discharge from the plants named as exudates by Malayali tribes of Chitteri hills. They use colour of exudates, change of colour in the exudates and the drying characters of the exudates as important criteria for identifying plant species. Malayali tribes consider the milky and white latex as *pal* in Tamil meaning milky secretion. They recognize 25 milky and white latex yielding plants belonging to 21 genera and 7 families (Table-2). The diversity of habit of these species is trees (14 species), shrubs (3 species), straggler (3 species), climber (3 species) and herb (2 species). Seven species are reported with colourless latex yielding plants, 5 species are reported with red exudates yielding plants. Eight species reported as gum yielding plants and 5 species are resin yielding plants.

For example, the bark of *Pterocarpus marsupium* naturally discharges red coloured latex in a steady continuous flow. Initially it is non viscous and later on it becomes viscous. After a period of 48 hrs, the red coloured latex changes into a semi solid black substance. The bark of *Buchanania axillaris* discharges watery latex very slowly without any cut open, after 2-3 hrs it turns into semi solid. Without any cut open bark steadily discharge of viscous milky latex is characteristic of *Ficus benghalensis*, *F. glomerata* and *F. microcarpa* and *Freitagosa*. The watery latex from the bark of *Cassine glatca* is natural one and turns into semisolid colourless gum in a few hours after discharge. The bark of *Semecarpus anacardium* is cut open, it discharges red coloured exudates very slowly and it turns into a semi solid black mass. On physical contact with the latex is injurious to the skin causing blisters.

| S. No. | Botanical Name | Family | Local name | Bark Characters |
|-------|----------------|--------|------------|----------------|
| 66.   | *Pongamia pinnata* (L.) Pierre. | Fabaceae | Pungamaram | Rough Bark |
| 67.   | *Prema tomentosa* Willd. | Lamiaecae | Ponnari | Rough Bark |
| 68.   | *Pterocarpus marsupium* Roxb. | Fabaceae | Vengai | Rough & Thick Bark |
| 69.   | *Santalum album* L. | Santalaceae | Sahnam | Rough Bark |
| 70.   | *Schleicheria oleosa* (Lour.) Oken. | Sapindaceae | Sakattamaram | Rough Bark |
| 71.   | *Semecarpus anacardium* L. | Anacardiaceae | Serra maram | Rough & Thick Bark |
| 72.   | *Shorea roxburghii* G. Don. | Dipterocarpaceae | Silar/Kunjiliyam | Rough & Thick Bark |
| 73.   | *Strychnos nux-vomica* L. | Loganiaceae | Yetti | Rough Bark |
| 74.   | *Strychnos spotatorum* L. | Loganiaceae | Thethamaram | Rough Bark |
| 75.   | *Swietenia mahagoni* (L.) Jacq. | Meliaceae | Mahagony | Rough Bark |
| 76.   | *Syzygium cumini* (L.) Skeels | Myrtaceae | Naval | Flaked Bark |
| 77.   | *Tamarindus indica* L. | Fabaceae | Puliymaram | Rough Bark |
| 78.   | *Tectona grandis* L.f. | Lamiaecae | Theku | Rough Bark |
| 79.   | *Terminalia arjuna* (DC.) Wight. & Arn. | Combretaceae | Neeramthi | Smooth, Thick & Flaked Bark |
| 80.   | *Terminalia bellirica* (Gaertn.) Roxb. | Combretaceae | Thandri | Rough & Thick Bark |
| 81.   | *Terminalia hebulata* Retz. | Combretaceae | Kadukai | Rough Bark |
| 82.   | *Terminalia crenulata* Roth. | Combretaceae | Karumarudhu | Rough and Segemented bark |
| 83.   | *Terminalia tomentosa* W. & A. | Combretaceae | Pillaimarudu | Rough & Thick Bark |
| 84.   | *Thespesia populnea* (L.) Soland. ex Corrêa | Malvaceae | Pouvarasu | Rough Bark |
| 85.   | *Thevetia peruviana* K. Schum. | Apocynaceae | Thangaarali | Rough Bark |
| 86.   | *Vitex altissima* L.f. | Verbenaceae | Mayiladi | Smooth Bark |
| 87.   | *Vitex negundo* L. | Verbenaceae | Vellainochi | Smooth Bark |
| 88.   | *Wrightia tinctoria* (Roxb.) R. Br. | Apocynaceae | Vetpaalai | Smooth Bark |
| S. No. | Botanical Name                  | Family             | Local Name | Identification Characters                  |
|-------|--------------------------------|--------------------|------------|-------------------------------------------|
| 1     | Agave angustifolia L.           | Agavaceae          | Katarali   | Succulence leaves                         |
| 2     | Albizia procera L.              | Fabaceae           | Kudumudurai| Riparian & Watery latex                   |
| 3     | Aloe vera (L.) Burm.f.           | Liliaceae          | Katralai   | Succulence leaves & Watery latex          |
| 4     | Andrographis alata (Vahl.) Nees.| Acanthaceae        | Siriyanganai| Taste                                      |
| 5     | Andrographis paniculata (Burm.f.) Wallich ex Nees.| Acanthaceae | Nilavembu | Taste                                      |
| 6     | Anogeissus latifolia (Roxb. ex DC.) Wall. ex Guill. & Per. | Combretaceae | Naimamaram/Vetkaali gum | Colour young leaves & Gum |
| 7     | Aristolochia indica L.          | Aristolochiaceae   | Aduthinapalai| Colour leaves                             |
| 8     | Artocarpus heterophyllus Lam.   | Moraceae           | Kaatupalai | Milky latex                               |
| 9     | Artocarpus hirsutus L.f.         | Moraceae           | Kari palamaram | Milky latex                             |
| 10    | Asparagus officinalis Wild.     | Liliaceae          | Thaineeravetankizangu | Tuber                                       |
| 11    | Bombax ceiba L.                 | Bombaceae          | Ilavu      | Riparian                                  |
| 12    | Bridelia crenulata Roxb.        | Euphorbiaceae      | Marivaengai | Red latex                                 |
| 13    | Buchanania axillaris (Dess.) T.P. Ramamoorthy inc. J. Saldanha & Nicolson | Anacardiaceae | Sulluki/Saraparuppumaram | Watery latex                                |
| 14    | Calatropsis procera Br.          | Apocynaceae        | Vellaeukkan | Milky latex                               |
| 15    | Calotropis gigantea (L.) R.Br.   | Apocynaceae        | Erukkan    | Milky latex                               |
| 16    | Caralluma ascodens var. attenuata Wight | Apocynaceae | Kallumullian | Watery latex                            |
| 17    | Cassine glauca (Rottb.) Kuntze   | Celastraceae       | Eelmanaram | Gum                                        |
| 18    | Catunaregum spinoa (Retz.) Poiret | Rubiaceae         | Marakaram | Root                                       |
| 19    | Chloroxylon swieteni DC.         | Rutaceae           | Purasamarang | Watery latex                             |
| 20    | Clerodendrum inerme (L.) Gaertn. | Verbenaceae        | Nar Sangullali | Taste of leaves                        |
| 21    | Cordia wallichii G. Don.         | Boraginaceae       | Panthekku  | Watery latex                               |
| 22    | Cosmystigma racemosum (Roxb.) Wight | Apocynaceae     | Padameratti | Milky latex                               |
| 23    | Crateva magni DC.                | Capparaceae        | -          | Tuber                                     |
| 24    | Croton bonplandianus Ballion    | Euphorbiaceae      | Poondu     | Watery latex                               |
| 25    | Cryptolepis grandiflora Wight.  | Apocynaceae        | Athankodi/Matangodi | Milky latex                      |
| 26    | Curcuma longa (L.) R.Br.         | Hypoxidaceae       | Nilapalaliu | Tuber                                      |
| 27    | Decalepis hamsamani Wight. & Arn. | Apocynaceae    | Mavilangum | Tuber & Milky latex                      |
| 28    | Dioscorea pentaphylla L.         | Dioscoreaceae      | Vallikilangu| Tuber                                      |
| 29    | Dioscorea bulbifera L.           | Dioscoreaceae      | Kavallikilangu | Tuber                                    |
| 30    | Dioscorea oppositifolia L.       | Dioscoreaceae      | Malaiyankilangu | Tuber                              |
| 31    | Diospyros ferruginea (Wild.) Bakh. | Ebenaceae        | Irumbuli   | Gum                                        |
| 32    | Drynaria quercifolia (L.) J. Sm. | Polyopodiaceae    | Attukakkilangu | Tuber                                      |
| 33    | Eucalyptus tereticornis Smith   | Myrtaceae          | Thaialamaram | Gum                                      |
| 34    | Euphoria antiqorum H. L.         | Euphorbiaceae      | Sathurakalli | Milky latex                               |
| 35    | Euphoria herophylly L.           | Euphorbiaceae      | Venmaikolunthu | Milky latex                        |
| 36    | Ficus benghalensis L.            | Moraceae           | Alararam    | Milky latex                               |
| 37    | Ficus glomerata Roxb.            | Moraceae           | Athimaram  | Milky latex                               |
| 38    | Ficus infectoria Wild.           | Moraceae           | Malalitichi | Milky latex & Riparian                  |
| 39    | Ficus microcarpa L.f.            | Moraceae           | Kalarasan  | Milky latex                               |
| 40    | Ficus racemosa L.                | Moraceae           | Athi       | Milky latex & Riparian                  |
| 41    | Ficus religiosa L.               | Moraceae           | Arsamaram  | Milky latex                               |
| 42    | Flueggea virosa (Wild.) Baillon  | Euphorbiaceae      | -          | Colour leaves                            |
| 43    | Gardenia gummi fera L.f.         | Rubiaceae          | Kambimaram | Resin                                     |
| 44    | Gardenia resinifera Roth.        | Rubiaceae          | Kambimaram | Resin                                     |
| 45    | Grevillea robusta A. Cunn. ex R. Br. | Proteaceae     | Malaisavuku | Resin                                     |
| 46    | Gymnema sylvestre (Retz.) L. R.Br. ex Roemer & Schultes | Apocynaceae | Sirukurinjan | Milky latex & Taste of leaf               |
| 47    | Hardwickia binauta Roxb.         | Fabaceae           | Achamanaram | Resin                                     |
| 48    | Hemidesmus indicus (L.) R.Br.     | Apocynaceae        | Sirumolikilangu | Tuber & Milky latex                      |
| 49    | Hiptage benghalensis (L.) Kurz.   | Malpighiaceae      | Suthalakodi | Leaf Glands                              |
| 50    | Incocarpus rutescens (L.) R.Br.   | Apocynaceae        | Palavikkolidi | Milky latex                             |
| 51    | Limonia acidissima L.            | Rutaceae           | Vila       | Gum                                        |
| 52    | Litsea oleoides (Meissner) Hook. f. | Lauraceae        | -          | Colour leaves                            |
| 53    | Madhuca longifolia (L.) Machr.   | Sapotaceae         | Kaatulluppa | Milky latex, Colour leaves & Riparian     |
| 54    | Maerua albiflora (Forskall) A.Rich. | Capparaceae | Pumisarkaralikzhangu | Tuber                                |
| 55    | Mallotus philippensis (Lam.) Muell. Arg. | Euphorbiaceae | Thiruchiilaimaram | Leaf Glands       |
| 56    | Mangifera indica L.              | Anacardiaceae      | Ma          | Riparian                                  |
| 57    | Manilkara hexandra Dubard        | Sapotaceae         | -          | Riparian                                  |
| 58    | Marsdenia tenacissima (Roxb.) Moon | Apocynaceae     | -          | Watery latex                              |
| 59    | Mirusosus elengi L.              | Saptoaceae         | Mulavumaram | Milky latex                              |
| 60    | Mirabilis jalapa L.              | Nyctaginaceae      | Anthimantharai | Tuber                                |
| 61    | Mitragyna parvifolia (Roxb.) North. | Rubiaceae | Neerkadapai | Riparian & Red latex                     |
| 62    | Morinda corea ex Buch. Ham.      | Rubiaceae          | ManjallKadapai/Nuna | Riparian & Gum                        |
| 63    | Musa paradisical L.              | Musaceae           | Valai      | Tuber                                     |
| 64    | Nerium olender L.                | Apocynaceae        | Alari       | Milky latex                               |

(Contd...)
Table 2: (Continued)

| S. No. | Botanical Name                  | Family       | Local Name          | Identification Characters            |
|--------|---------------------------------|--------------|---------------------|--------------------------------------|
| 65.    | Pavonia zeylanica (L.) Cav.     | Malvaceae    | Sitramutti          | Root                                 |
| 66.    | Pentatropsis capensis (T.f.) Bullock | Apocynaceae | Uppalankodi         | Watery latex                         |
| 67.    | Pergularia daemia (Forsskal) Chiov | Apocynaceae | Uthamanai           | Milky latex                          |
| 68.    | Plecospermum spinosum (Roxb. ex Wild.) Trecul. | Moraceae | -                   | Milky latex                          |
| 69.    | Plumeria rubra L.               | Apocynaceae  | Arali               | Milky latex                          |
| 70.    | Polygonia cerasoides (T.f.) Bullock | Apocynaceae | Senthalamaram       | Red latex                            |
| 71.    | Pongamia pinnata (L.) Pierre    | Fabaceae     | Pungan              | Riparian                             |
| 72.    | Premna tormentosanaW. & A.      | Verbenaceae  | Ponneri             | Colour leaves                        |
| 73.    | Pterocarpus marsupiumRoxb.      | Fabaceae     | Vengai              | Red latex                            |
| 74.    | Semecarpus anacardiun L.        | Anacardiaceae| Serra maram         | Red latex, Taste & Colour leaves      |
| 75.    | Shorea roxburghii. Don.         | Dipterocarpaceae | Silari/Kungiliyam | Gum                                  |
| 76.    | Syzygium cumini (L.) Skeels     | Myrtaceae    | Naval               | Riparian                             |
| 77.    | Tephrosia purpurea (L.) Pers.   | Fabaceae     | Kozingi             | Root                                 |
| 78.    | Terminalia arjuna (DC.) Wight. &Arn. | Combretaceae | Neermathi           | Riparian, Resin & leaf Glands        |
| 79.    | Terminalia bellirica (Gaertner) Roxb. | Combretaceae | Thandrikaai         | Riparian                             |
| 80.    | Terminalia crenulata Roth.      | Combretaceae | Karumarudhu         | Riparian & Gum                       |
| 81.    | Terminalia tomentosa W. & A.    | Combretaceae | Pillaimarudu        | Leaf Glands                          |
| 82.    | Tylorrhapha indica (Burmit) Merr. | Apocynaceae | Kuthupalai          | Milky latex                          |
| 83.    | Vitex negundo L.                | Verbenaceae  | Notchi              | Riparian & Colour leaves             |
| 84.    | Withania somnifera (L.) Duanl   | Solanaceae   | Amarakankilangu    | Root                                 |
| 85.    | Wrightia tinctoria (Roxb.) R.Br. | Apocynaceae | Veppalai            | Milky latex                          |

**Figure: 1 Study area**

the Malayali explain the periodicity of the flow of latex thus: “The rate of flow of latex from the trees is influenced by rainfall. If the species receives sufficient rainfall, the discharge of latex is copious and if the species receives insufficient rainfall, the discharge of latex is scanty”. The scientific explanation for this phenomenon is as follows: “Under conditions of heavy rainfall, the cells are supersaturated with water resulting in increased turgour within the plant body. This leads to copious discharge of latex. On the other hand under conditions of drought or scanty rainfall, the cells become flaccid resulting in scanty discharge of the latex”. Though they may not know the scientific basis for this phenomenon, it must be agreed that their observation is correct.

**Leaf characters**

Many tribes familiar with plants use sight, touch, taste, smell and sound for identification and classification of particular plant species. Tribal experience with the organoleptic properties of plants in identification comprises smell, touch and taste (Newmaster et al., 2006). Sensory perception gained by experience is an important tool for plant identification (Getchell et al., 1991; Messer, 1991).

The taste qualities that humans perceive in plants, especially bitterness, have been proposed as significant clue used in primitive societies. Malayali of Chitteri hills have clear knowledge of identification of the species in which leaf characters such as colour, taste, smell, succulence and glands form important criteria.

The Malayali of Chitteri hills also use their personal experience of taste for identification of certain species of plants. By experiencing the leaf taste they identified the following plants Andrographis paniculata, Andrographis alata, Gymnema
Prabakaran and Senthil Kumar

Prabakaran and Senthil Kumar, Nannari Moodi Anogeissus latifolia parts belonging to 16 genera under 15 families. Roots, rhizome of the plant species by utility. They used 19 underground plant Malayali tribes of Chitteri hills identified underground parts of rhizome, tuber, corms and bulbs for their use. Tribes of Kadars, Malasars, Maduvars and Malamalaars of various regions use underground parts for their sustainable use. Tribes of Kadars, Malasars, Maduvars and Malamalaars of Parambikulam wild life sanctuary, Kerala, listed ten edible plants and tuber of these plants are used for preparing raw drug to cure ailments and food. Of these 19 species, 5 are used as food, the rest are used for medicinal properties.

Rhizomes of Dioscorea bulbifera, Dioscorea pentaphylla and Dioscorea oppositifolia are cooked and eaten. Roots of Decalepis hamiltonii are pickled and used as food adjuvant. The roots of Hemidesmus indicus yield a coolant drink called ‘Nannari sharbath’.

The Malayali tribal have a wide knowledge of conserving plant species. They adopt specific strategies while harvesting plant parts for their use. For example while collecting the Dioscorea sp. they know at what stage of plant growth the rhizome is to be dugout. Based on plant and leaf growth, a Malayali knows whether the rhizome is mature or immature. They are also conscious of conserving the plant for posterity. While digging out the rhizome, they leave out some portion of rhizome with bud (called as “Moodi” in Tamil) so that it can grow in next season. This practice protects the species from extinction. They roast or boil the rhizome for consumption. The upper portion of rhizome is not used in cooking, as it cause itching sensation.

The roots of Decalepis hamiltonii is collected, washed with water, cut into small pieces and dried in the sun. The dried root pieces are pickled. Roots of Hemidesmus indicus collected, washed with water and crushed freshly to prepare a coolant drink called ‘Nannari sharbath’ Malayali tribes of Chitteri hills and tribes of various regions use underground parts for their sustainable use. Tribes of Kadors, Malasars, Maduvars and Malamalaars of Parambikulam wild life sanctuary, Kerala, listed ten edible underground parts of rhizome, tuber, corms and bulbs for cooking curry. The rhizome of Dioscorea sp. causes terrible itching sensation in ones throat if eaten raw. They peel off the outer layer, boil the rhizome in tamarind water and smear with turmeric paste to make it palatable (Yesodharan & Sujana, 2007).

Today we know that raphides (the needle like crystals) of calcium oxalate present in the parenchyma cells of the tubers prick the tongue and mouth causing irritation. When soaked and cooked with tamarind, the tannic acid present in tamarind dissolves the crystals. It is surprising as to how the tribal people knew of the use of tamarind for this purpose.

Ecological characters

Ecological knowledge, such as where a particular plant lives is another important criterion used by the tribes for identifying plants and is perhaps limited to the geographic region. Ecology appears to play an important role in how people classified the flora and fauna of a given area (Areendran & Rao, 2009).

Malayali tribes use landscape characters to a greater extent for identifying certain species of plants. They have accurate knowledge about species such as Ficus tomentosa, Caralluma attuneta and C. umbellata occurring in rocky terrains. Malayali tribes are knowledgeable about connecting certain species to
the particular landscape and naming the species accordingly. The naming of plant in vernacular language is based on habitat; one typical example is *Caralluma attunetra* which is locally called *kallumuliyan* in Tamil, because this species always occurs in rocky areas.

*Albizia procera* an exotic plant that occurs very rarely in Chitteri hills is another good example for this. The bark of this tree, which is used to cure all types of bone fractures, is called *Koodumathurai* in Tamil. The Tamil word *Koodu* means meeting or group and ‘to join’. This species always occurs in a group of three to five. Its medicinal property joins fractured bones as well. Therefore, the Tamil vernacular name appears appropriate. *Decalepis hamiltonii* of Apocynaceae is another species growing in rocky areas. Malayali always look for this plant in rocky areas as their root tubes picked as consumed as food adjuvant. The tubers have cooling properties.

To cite some more examples on their knowledge of the habitat characteristic of plants, they recognize the following plants as riparian. The field notes of the following species: *Terminalia arjuna* is characteristic riparian (riverbanks) (Matthew, 1995). According to Gamble it is more scarce in Carnatic region except in Tirunelveli and on the West coast; on the banks of rivers and streams. *Terminalia crenulata* reported as occasional in riverbanks (Matthew, 1995), *Syzygium cumini* is representing variety of habitats: Shoals, riverbanks, scrub jungle (Matthew, 1995). It occur in all forest districts, both in plains and in the hills up to 6000 ft., usually along river banks and in moisture localities (Gamble & Fisher, 1935).

*Vitex negundo* is common in riverbanks or fencing near households (Matthew, 1995). It is present in the dry region up to 5000ft in the hills, on wastelands around villages, on roadsides and the banks of streams, common (Gamble & Fisher, 1935). *Bombax ceiba* occur from plains to coast, especially along riverbanks; on the deciduous belt of the hills to 800m (Matthew, 1995), *Drosera indica* is bloom up with the monsoons (unless in perennially moist ground) (Matthew, 1995) and wet places in hills. According to Gamble *Mangifera indica* occurs in ravines up to 4000ft. *Mitragyna parvifolia* is often reported along rivers and foothills to 800m (Matthew, 1995). *Pongamia pinnata* represent mostly by banks of rivers, in ravine (Matthew, 1995). It is present from coastal forest to tidal riverbanks; inland chiefly along streams and rivers in most districts in the hills up to 5000ft (Gamble & Fisher, 1935) attests to their riparian nature.

Just as a field-botanist has his own scientific approach towards identifying plants in order to pick useful ones, native tribes also have their own approach based on direct observation and macro characters and this serves the purpose. Therefore, we should not dismiss the traditional knowledge of the tribal people as something without scientific basis.

In conclusion, the identification of the usefulness of a plant by organoleptic characters as practiced by the tribal people around the world may be a simple and useful tool to those who do not have a formal botanical training. This knowledge is transmitted orally from generation to generation in the tribal population. Though for scientific purposes this approach of identification of plants cannot be the sole basis, it is certainly useful as it offers supportive field characters for confirming identification. In this context, it is recommended that such indigenous knowledge is documented and incorporated in the floristic publications of the regional floras.

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