



## **Phytotherapeutic Plants Of Madukkarai Hills In The Southern Western Ghats Of Coimbatore District, Tamil Nadu, India**

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*The present study deals with 72- plant species distributed in 59- genera belonging to 33- families used as ethnomedicines for the health care of the rural people in the Madukkarai Hills, Coimbatore district, Tamil Nadu. The information on correct botanical identity with family, local name and traditional practices for the treatment of various ailments are discussed. This type of study on indigenous herbal medicine can serve to validate and enhance existing local uses and to provide clues to remedies having worldwide potential.*

**Key Words:** Traditional practices, Herbal remedies, Madukkarai hills, Southern Western Ghats, Tamil Nadu

### **Introduction**

The use of plants as medicine is widespread throughout the world. It is estimated that more than 35,000 plant species are being used around the world for medicinal purposes<sup>1</sup>. India is endowed with rich wealth of medicinal plants which are widely used by all sections of people either directly as folk remedies or in different indigenous systems of medicine or indirectly in the pharmaceutical preparations of modern medicines<sup>2</sup>. More than 8, 000 plants are used in our country especially for their medicinal values by the rural people<sup>3</sup>. The traditional wisdom is based on the intrinsic realization that man and nature form part of an indivisible partner and should live in partnership with each other<sup>4</sup>.

The plant and plant products have augmented human culture since time immemorial. But few people realize that plant species an important part of our environment<sup>5</sup>. Many traditional societies have accumulated a whole lot of empirical knowledge on the basis of their experience dealing with nature and natural resources<sup>6</sup>. They living in biodiversity rich areas possess a wealth of knowledge on the local utilization and conservation of food and medicinal plants<sup>7</sup>. The knowledge of medicinal has been accumulated in the course of many centuries based on different Indian systems of medicines such as Ayurveda, Unani and Siddha. These systems of medicine play a very important role in healthcare system of rural people covering all types of ailments<sup>8</sup> and developed over years of observation, trial and error, inference and inheritance has largely remained with the aboriginal people<sup>9</sup>.

Traditional medicinal practices and ethnobotanical information play an important role in the scientific research, particularly when the literature and field work data have been properly evaluated. The documentation of indigenous knowledge on the utilization of local plant resources by different ethnic groups or communities is one of the main objectives of ethnobotanical research<sup>10</sup>. Diverse utilization of medicinal plants has been reported by many researchers from Tamil Nadu<sup>11-19</sup>. However, no work has been carried out so far on the enumeration and status of medicinal plants in Madukkarai hills of Coimbatore district. Therefore, the study was undertaken with a view to provide a comprehensive account of folklore medicinal plants in the study area.

### **Study Area**

Madukkarai is located at 10.9N 76.97°E along the hill sides of the Southern Western Ghats (a biodiversity hot spot), of Coimbatore, Tamil Nadu and also a part of Nilgiri Biosphere Reserve. The name "Madukkarai" originated from the colloquial use of the words "Mathil" (means Great wall in Tamil) + "Kara" (means Shore in Tamil). It has one of the oldest cement plants in India. The temperature ranges from 4°C and 16°C respectively. The vegetation types were observed from the study area is of different types such as tropical dry deciduous forests, thorn shrub forests and wastelands respectively. The area has predominant with alluvial soil and sandy soil and majority of the parts are consisting of rocky habitats with huge deposits of limestone.

### **Materials And Methods**

The study was conducted between September 2010 and April 2011 during different flowering periods at different areas. The information on medicinal plants was gathered from the elderly medicine men, who knew well about the surrounding wild and cultivated plants in forests, their local names, parts used, preparation of herbal medicine, mode of administration, dosage and uses in different ailments and diseases. The collected plant species were identified with the help of relevant published floras<sup>20 - 26</sup> and the voucher specimens have been deposited in the Herbarium, Department of Botany, Bharathiar University, Coimbatore for further reference.

## Results And Discussion

A preliminary survey in this region has indicated the uses of plants for using various ailments like asthma, diabetes, dysentery, urinary diseases, rheumatism, cold and cough, fever, skin diseases, etc. In the present study, the therapeutic uses of 72- medicinal plants used by the local healers of Madukkarai Hills, Coimbatore district, Tamil Nadu, India belonging to 33- families and 59- genera are gathered. Plants are enumerated with botanical names, family (in parenthesis), local names (*Tamil*), ecological status and use of different plant in various ailments (Table -1).

Acanthaceae and Amaranthaceae are the dominant families with 7- species each, followed by Malvaceae (6- species), Asteraceae and Lamiaceae (5- species each), Fabaceae (4- species) and Euphorbiaceae (3- species) and rest of the families represented by two or single species. (Fig. 1). Through the continuous and extensive field studies, following 3- statuses of medicinal plants in Madukkarai Hills were recorded as *frequently* observed species in almost all areas (Common), *less* frequently observed species (Scattered) and *very less* frequently observed species in some particular areas (Rare) (Fig. 2).

It was also recorded that some plants used as a medicine in this region are not used elsewhere in the country. On the other hand, some well known species like *Acalypha indica*, *Ageratum conyzoides*, *Desmodium triflorum*, *Plumbago zeylanica*, *Plectranthus barbatus*, *Pouzolzia zeylanica* and *Sida cordifolia* are rarely used in this region in contrast with their common use in other parts of the country may be due to lack of exchange of knowledge.

The therapeutic use of *Abutilon indicum*, *Aloe barbadensis*, *Altemanthera sessilis*, *Boerhaavia diffusa*, *Euphorbia hirta*, *Mimosa pudica*, *Phyllanthus amarus*, *Solanum trilobatum*, *Tribulus terrestris* and *Tridax procumbens* reported from this region resemble previous reports<sup>27</sup>. The curative properties of some species like *Aerva lanata*, *Andrographis paniculata*, *Caralluma diffusa*, *Adiantum incisum*, *Biophytum sensitivum*, *Merremia tridentata*, *Tephrosia purpurea*, *Vanda spathulata* and *Vernonia cinera* are used to heal diabetes, jaundice, obesity, dysentery, urinary disorders, stomach problems, diarrhoea, asthma and rheumatism.

Different parts of medicinal plants were used as medicine by local traditional healers. Among the different plant parts, the leaves were most frequently used (34%) for the treatment of diseases followed by whole plant parts (28%), roots (18%), seeds (9%), stem and root bark (6%) and flowers (5%) (Fig. 3). The most common (reportedly effective) method of preparing medicine is decoction followed by juice, powder and paste. These recopies are prepared using different ingredients of non-plant origin such as water, milk, honey, etc. Both external application and internal consumption of the preparations were involved in the treatment of diseases. It was observed that, most of the remedies consist of single part and more than one method of preparation. However, many of the remedies consisted of different parts of the same plant species to treat single or more diseases.

**Table 1: List of medicinal plants in the study**

S. No.	Botanical Name with Family	Common Name	Part (s) Used	Ecological Status	Medicinal Uses
1	<i>Abutilon indicum</i> G. Don. (Malvaceae)	Thutthi	Whole Plant	Common	Whole plant extract used as urinary troubles.
			Leaves		Leaves cooked the extract is used as diuretic and demulcent.

			Bark		Bark used as diuretic.
			Roots		Roots used as anti-pyretic and in piles.
2	<i>Acalypha indica</i> L. (Euphorbiaceae)	Kuppaimeni	Whole Plant	Common	Decoction of whole plant used as a laxative and for gastro-intestinal ailments.
			Leaves		Juice of fresh leaves is emetic, and used to cure of cough.
3	<i>Achyranthes aspera</i> L. (Acanthaceae)	Nayurivi	Whole plant	Common	Decoction of whole plant used as diuretic.
			Leaves		Young leaves are used as spinach.
4	<i>Actinopteris australis</i> Link. (Actinopteridaceae)	Sumaithangi	Whole plant	Rare	The plant used in antibiotic, anti-fertility and antiseptic.
5	<i>Adiantum incisum</i> Forsk. (Adiantaceae)	Myilkondai	Whole plant	Rare	Whole plant used in diabetes.
			Roots		Fresh roots are used in migraine.
6	<i>Aerva lanata</i> (L.) A.L.Juss. ex schult. (Amaranthaceae)	Poolai poo	Whole plant	Common	Used in cough, sore throat, diuretic and diabetes.
			Roots		Roots are used as diuretic.
7	<i>Ageratum conyzoids</i> L. (Asteraceae)	Pumpillu	Whole plant	Common	Whole plant decoction used for diarrhoea, dysentery and gastro intestinal ailments.
			Seeds		Seeds used as health tonic.
			Root bark		Root bark used as purgative.
8	<i>Aloe barbadensis</i> Mill. (Liliaceae)	Chothu kathaalai	Leaves	Scattered	Fresh juice of leaves used in fever and eye problems.
9	<i>Alternanthera pungens</i> H.B.& K. (Amaranthaceae)	Mul ponnankanni	Leaves	Common	Juice of leaves used as soups. To cure night blindness.
10	<i>Alternanthera sessilis</i> DC. (Amaranthaceae)	Ponnankanni keerai	Leaves	Common	Leaf paste is for snake bite.
11	<i>Amaranthus caudatus</i> L. (Amaranthaceae)	Sirukerai	Leaves and Stems	Common	Leaves and stems used as green vegetable.
12	<i>Amaranthus spinosus</i> L. (Amaranthaceae)	Mullukkerai	Leaves	Common	Leaves used for kidney complaints.
			Whole plant		Whole plant used for snake bites.
13	<i>Amaranthus viridis</i> L. (Amaranthaceae)	Kuppai keerai	Leaves	Common	Leaves used against scorpion sting.
14	<i>Andrographis echinoides</i> Nees. (Acanthaceae)	Gopuram thangi	Whole plant	Rare	Plants used to cure fever.
15	<i>Andrographis paniculata</i> Wall. ex. Nees. (Acanthaceae)	Periyanangai	Whole plant	Rare	Decoction of whole plant used in dysentery, diabetes, itches, piles and jaundice.
16	<i>Argemone mexicana</i> L. (Papaveraceae)	Kodiyoetti	Latex	Common	Yellow juice is used in scabies and in ophthalmia.
17	<i>Arundinella setosa</i> Trin.	Kattu pullu	Whole plant	Common	Used as fodder for cattle's to yield milk.

	(Poaceae)				
18	<i>Barleria buxifolia</i> L. (Acanthaceae)	Chullimullu.	Leaves and Roots	Common	Leaves and roots used to cure cough and inflammations.
19	<i>Barleria cristata</i> L. (Acanthaceae)	Kattu kanagambaram	Leaves and Roots	Scattered	Leaves and roots used to reduce swellings.
20	<i>Barleria prionitis</i> L. (Acanthaceae)	Shemmullu	Leaves Roots	Rare	Fresh leaves chewed to relieve toothache. Roots used to cure boils and glandular swellings.
21	<i>Begonia malabarica</i> Lam. (Begoniaceae)	Sengurangu	Leaves	Rare	Leaf juice used for head ache and to cure wounds.
22	<i>Biophytum sensitivum</i> (L.) DC. (Oxalidaceae)	Mookuthi poodu	Whole plant Leaves	Common	Used in chest complaints and inflammations. Decoction of leaves given for diabetes and asthma.
23	<i>Boerhaavia diffusa</i> L. (Nyctaginaceae)	Mukurattai	Whole plant Roots	Common	Used for stomach problems, cough, jaundice and skin diseases. Used in rheumatism and asthma.
24	<i>Caralluma adscendens</i> (Roxb.) Haw. (Asclepiadaceae)	Muyalkombu chedi	Whole plant Root bark	Scattered	Whole plant is used for curing obesity. The root bark is used for skin diseases and
25	<i>Caralluma diffusa</i> (Wight.) N.E.Br. (Asclepiadaceae)	-	Whole plant	Scattered	Whole plant is used for curing obesity.
26	<i>Cassia occidentalis</i> L. (Caesalpinaceae)	Peyavarai	Seeds	Common	Used externally for skin troubles.
27	<i>Commelina benghalensis</i> L. (Commelinaceae)	Adhuthinna- thalai	Rhizomes	Common	Rhizomes are cooked and eaten as vegetables.
28	<i>Corchorus aestuans</i> L. (Tiliaceae)	-	Seeds	Common	Seeds used as stomachic.
29	<i>Corchorus capsularis</i> L. (Tiliaceae)	-	Leaves	Common	Leaves are as consumed health tonic.
303	<i>Cyperus kyllingia</i> Endl. (Cyperaceae)	-	Rhizomes	Common	Decoction of rhizomes used as a diuretic and to cure fever.
31	<i>Datura metel</i> L. (Solanaceae)	Vellai umathai	Leaves	Common	Leaves used as anti- plasmodic.
32	<i>Dendrophthoe falcata</i> (L. f.) Etting. (Loranthaceae)	Palvithil pulluri	Bark	Rare	Bark used for menstrual troubles and asthma.
33	<i>Desmodium triflorum</i> (L.) DC. (Fabaceae)	Siruulladi	Leaves	Scattered	Leaf juice used for dysentery and diarrhoea.
34	<i>Digera muricata</i> (L.) Mart.	Thoyyakkeer ai	Flowers	Common	Flowers used in urinary troubles.

	(Amaranthaceae)		Seeds		Seeds used as purgative.
35	<i>Euphorbia hirta</i> L. (Euphorbiaceae)	Amman patcharisi	Whole plant	Common	Used for cough, asthma and dysentery.
			Leaves		Leaves eaten as green vegetable.
			Latex		Latex applied to wounds.
36	<i>Evolvulus alsinoides</i> L. (Convolvulaceae)	Vishnukrandi	Whole plant	Common	Plants used in dysentery and rheumatism.
37	<i>Gynandropsis gynandra</i> (L.) Briq. (Capparidaceae)	Nallavelai	Leaves	Common	Leaves used to treat snake-bites.
38	<i>Heteropogon contortus</i> (L.) Beauv. (Poaceae)	Oosipul	Roots	Common	Roots used as stimulant and diuretic.
39	<i>Hibiscus micranthus</i> L.f. (Malvaceae)	-	Fruits	Common	Young fruits are edible.
40	<i>Hybanthus enneaspermus</i> (L.) F. Muell. (Violaceae)	Orilai- thamarai	Whole plant	Common	Whole plant used as diuretic.
			Roots		Roots used for urinary troubles and bowel complaints of childrens.
41	<i>Indigofera nummularifolia</i> (L.) Livera. (Fabaceae)	Kallukka chammanthi	Whole plant	Scattered	Whole plant used for liver complaints.
42	<i>Indigofera trita var. scabra</i> (Roth) Ali. (Fabaceae)	Kandaram	Seeds	Rare	Seeds used as a nutritive tonic.
43	<i>Justicia tranquebariensis</i> L.f. (Acanthaceae)	Sivanarvempu	Leaves	Common	Juice of leaves used as cooling agent to cure small pox.
44	<i>Leucas aspera</i> Spreng. (Lamiaceae)	Thumbai	Leaves	Common	Juice of the leaves applied externally in chronic, skin eruptions and painful swellings.
45	<i>Merremia tridentata</i> (L.) Hall. (Convolvulaceae)	Mudiyakunthal	Whole plant	Common	Plant extract used to treat rheumatism, piles and urinary disorders.
			Roots		Decoction of roots used for rheumatism, piles and urinary disorders.
46	<i>Mimosa pudica</i> L. (Mimosaceae)	Thottal surungii	Roots	Common	Decoction of roots used in asthma and dysentery.
47	<i>Ocimum americanum</i> L. (Lamiaceae)	Naithulasi	Seeds	Rare	Powdered seeds are given with milk to cure fever.
48	<i>Ocimum gratissimum</i> L. (Lamiaceae)	Perum thulasi	Whole plant	Scattered	Plant used as digestive, tonic, stimulant, diuretic, anti septic and coughs.
			Seeds		Seed is cure head ache, dysentery and urinary disorders.
49	<i>Ocimum tenuiflorum</i> L. (Lamiaceae)	Thulasi	Leaves	Common	Leaf juice is used to cure stomach ache and fever.
50	<i>Parthenium hysterophorus</i> L. (Asteraceae)	Vesapoodu	Whole plant	Common	Decoction of whole plant given in dysentery.
51	<i>Petalium murex</i> L.	Perunerunji	Leaves	Common	Leaves used as diuretic and also used for

	(Pedaliaceae)			n	gonorrhoea.
52	<i>Phyllanthus amarus</i> Schult. & Thorn. (Euphorbiaceae)	Kezhanelli	Whole plant	Common	Plant juice is given orally in empty stomach to cure jaundice.
53	<i>Plectranthus barbatus</i> Andr. (Lamiaceae)	-	Leaves	Rare	Leaf juice is taken to cure eye problems. Used for reduced eye pressure, weight loss.
54	<i>Plumbago zeylanica</i> L. (Plumbaginaceae)	Chithiramulam	Roots	Common	Roots used to cure diuretic, piles, diarrhoea, dyspepsia, influenza, fever and skin diseases.
55	<i>Polycarpha corymbosa</i> (L.) Lam. (Caryophyllaceae)	Nilaisedachi	Leaves	Scattered	Leaves used in jaundice, boils and inflammatory swellings.
56	<i>Polygala chinensis</i> L. (Polygalaceae)	-	Leaves	Common	Leaf juice given in asthma, chronic bronchitis and catarrhal affection.
			Roots		Roots used to cure fever.
57	<i>Portulaca pilosa</i> L. (Portulacaceae)	-	Whole plant	Common	Used as diuretic.
58	<i>Pouzolzia zeylanica</i> (L.) Benth. (Urticaceae)	Kallurki	Leaves	Rare	Juice of leaves given as a galactagogue.
59	<i>Sesamum indicum</i> L. (Pedaliaceae)	Ellu	Leaves	Scattered	Fresh leaves used in affections of kidneys and bladder.
			Seeds		Used as diuretic.
60	<i>Sida acuta</i> Burm. f. (Malvaceae)	Arivamooku kerai	Leaves	Common	Decoction of leaves used as diuretic.
61	<i>Sida cordifolia</i> L. (Malvaceae)	Nilatutti	Leaves	Common	Leaves used to treat dysentery.
			Roots		Roots diuretic and tonic to cure urinary troubles.
62	<i>Sida rhombifolia</i> L. (Malvaceae)	Chitramutti	Whole plant	Scattered	Used in rheumatism and tuberculosis.
			Stem		Used for skin troubles and as diuretic.
63	<i>Solanum trilobatum</i> L. (Solanaceae)	Thuthuvelai	Leaves	Rare	Leaves with dried ginger and pepper are made into decoction and given orally to cure cough and cold.
64	<i>Stachytarphata jamaicensis</i> Vahl. (Verbenaceae)	Simainayurivi	Leaves	Rare	Dried leaves are used to cure intestinal worms, ulcers, stomach ailments.
65	<i>Tephrosia purpurea</i> (L.) Peers. (Fabaceae)	Kolinjii	Root	Common	Root extract is given orally or roots are chewed for curing stomach pain.
66	<i>Tribulus terrestris</i> L. (Zygophyllaceae)	Nerunjii	Fruits	Common	Fruit tonic used as diuretic.
			Roots		Roots used for respiratory problems.
67	<i>Tridax procumbens</i> L. (Asteraceae)	Vettukaithalai	Leaves	Common	Juice of leaves used as insecticidal and also used to wounds.

68	<i>Urena lobata</i> L. (Malvaceae)	Ottatti	Stem and roots	Rare	Decoction of stem and roots used for flatulent colic.
			Flowers		Flowers used as expectorant and cure sore throat.
69	<i>Vanda spathulata</i> Spreng. (Orchidaceae)	-	Flowers	Rare	Dried flowers are powdered are given for asthma.
70	<i>Vernonia cinerea</i> (L.) Less. (Asteraceae)	Mukuttippundu	Flowers	Scattered	Flowers used to cure fever and rheumatism.
			Seeds		Seeds used to intestinal worms and skin diseases.
			Roots		Decoction of roots given in diarrhoea, stomach ache and cough.
71	<i>Vicoa indica</i> (L.) DC. (Asteraceae)	Jimikipoo	Whole plant	Rare	Whole plant extract used for cough, fever and skin diseases.
72	<i>Waltheria indica</i> L. (Sterculiaceae)	Shembudu	Roots	Common	Decoction of roots used as purgative.

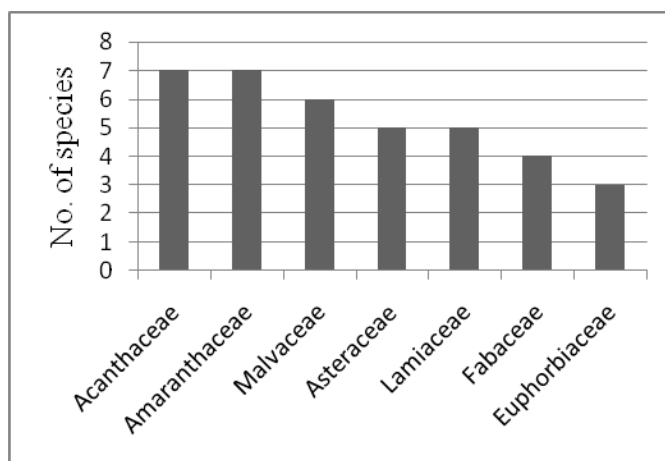
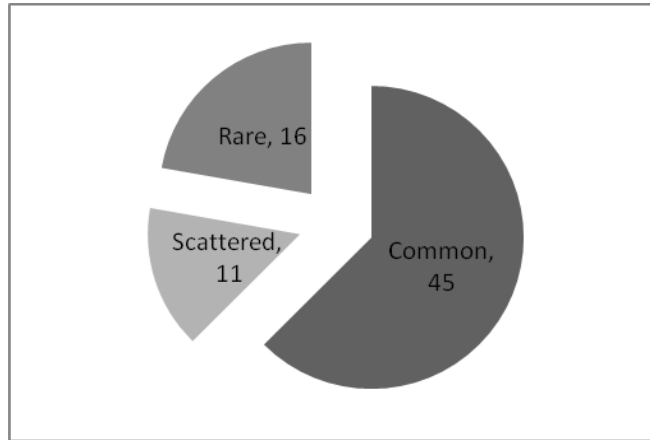
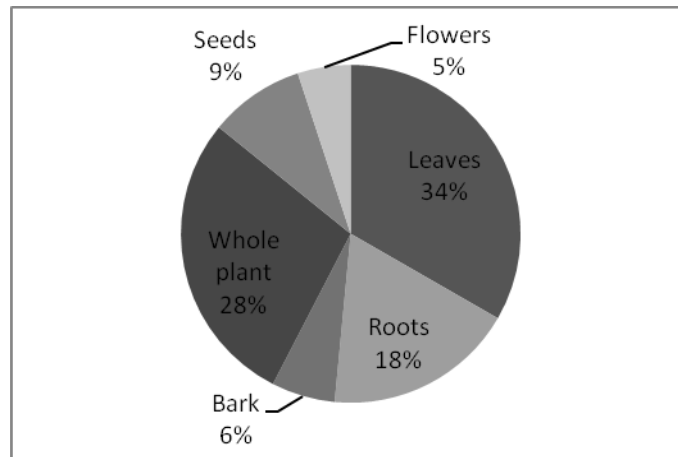


Fig. 1: Analysis of dominant families of medicinal plants in the study



**Fig. 2: Distribution statuses of medicinal plants in the study**



**Fig. 3: Analysis of different plant parts of medicinal plants in the study**

The results of the study have demonstrated that medicinal knowledge of plants in the Madukkarai hills is well preserved tradition held by local healers. They have accumulated extensive knowledge of medicinal plants by their long association with the diversity of plants in the study area. Further research is needed to evaluate the consensus of medicinal utility of plants within and among these cultures.

### **Conclusion**

The present survey indicated that, the study area has diversified medicinal plants to treat wide spectrum of human ailments and also points out that certain species of medicinal plants are being exploited by the local residents who are unaware of the importance of medicinal plants in ecosystem. It is concluded that even though the accessibility of western medicine for simple and complicated diseases is available, many people in the study area are still continue to depend on medicinal plants atleast for the treatment of some simple diseases such as cold, cough, fever, headache, poison bites, skin diseases and stomach problems. Well-know ledged healers have good interactions with patients and this would improve the quality of healthcare delivery. There is a possibility of losing this wealth of knowledge in the future due to lack of interest among the younger generations. Therefore, it becomes necessary to acquire and



preserve this traditional system of knowledge by proper documentation and identification of plant specimens.

## REFERENCES

1. Van Seters AP. Non-Wood Forest Products. Food and Agriculture Organization, 1997, 116.
2. Alagesboopathi C. Ethnomedicinal Plants used as Medicine by the Kurumba Tribals in Pennagaram Region, Dharmapuri District of Tamil Nadu, India. *Asian J. Exp. Biol. Sci.* 2011; 2 (1): 140 -142.
3. Tiwari DN. Report of the task force on conservation and sustainable uses of medicinal plants. Bull Planning Commission, Govt. of India, New Delhi, 2000.
4. Ramakrishnan PS. What is traditional ecological knowledge (TEK)? In: Traditional ecological knowledge for managing Biosphere Reserve in South and Central Asia (Ramakrishnan PS, Rani RK, Katwal RPS, Malandiratta, Eds.). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi, 2002.
5. Singh PB. Medicinal Plants of Ayurvedic importance from Mandi District of Himachal Pradesh. *Bull. Medico- Ethnobot. Res.* 1993; 14: 126 – 136.
6. Pandey RS., Kumar A. An ethnobotanical study in the Vindhyan region, Uttar Pradesh. *Ind. Forest.* 2006; 29 (3): 389 – 394.
7. Thothathri K, Sen R, Pal DC. Status of medicinal plants in Indian flora. *J. Econ. Taxon. Bot.* 1989; 13 (3): 605 – 614.
8. Sandipan Das, Khan, M.L., Abhijit Rabha and Bhattachargya, D.K. Ethnomedicinal plants of Manas National Park, Assam, Northeast India. *Ind. J. Trad. Knowl.* 514 – 517 (2009).
9. Ragupathy S, and Mahadevan A. Ethnobotany of Kodaikkarai reserve forest, Tamil Nadu, South India. *Ethnobot.* 1991; 3: 79 – 89.
10. Shrestha KK. Ethnobotanical inventory and plant taxonomy basis approaches for Ethnobotanical research. In: *Ethnobotany for Conservation and Community Development* (Shrestha KK. Ed.). Ethnobotanical society of Nepal, Kathmandu, Nepal, 1998, 58 – 65.
11. Dwarakan P, Ansari AA. Ethnobotanical notes of Valikadupatti and surroundings of Kollimalai of Salem District, Tamil Nadu. *J. Econ. Taxon. Bot. (Addl. Ser.)* 1992; 10: 495 - 499.
12. Rosakkutty PJ, Stella Roslin A, Ignacimuthu S. Some traditional folklore medicinal Plants of Kanyakumari District, *J. Econ. Taxon. Bot.* 1999; 2 (3): 369 – 375.
13. Viswanathan MS, Premkumar EH, Ramesh N. Ethnomedicines of Kanis in Kalakkud- Mundenthurai Tiger Reserve, Tamil Nadu, *Ethnobot.* 2001; 13: 60 - 66.
14. Arinathan V, Mohan VR, John de Britto A. Ethno- medicinal survey among Palliyar Tribals of Srivilliputhur Grizzled Giant squirrel Wild life Sanctuary, Tamil Nadu. *J. Econ. Taxon. Bot.* 2003; 2: 707 -710.
15. Ganesan S, Suresh N, Kesavan L. Ethnomedicinal survey of lower Palani Hills of Tamil Nadu. *Ind. J. Trad. Knowl.* 2004; 3: 299 – 304.
16. Udayan PS, Sateesh G, Thushar KV, Indira B. Ethnomedicine of Chellipale Community of Namakkal District, Tamil Nadu. *Ind. J. Trad. Knowl.* 2005; 4: 437 - 442.
17. Muthu C, Ayyanar M, Raja N, Ignacimuthu S. Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India. *J. Ethnobiol. Ethnomed.* 2006; 2: 43.
18. Ignacimuthu S, Ayyanar M, Sakarasivaraman K. Ethnobotanical investigations among tribes in Madurai district of Tamil Nadu, India. *J. Ethnobiol. Ethnomed.* 2006; 2: 25.
19. Maruthapandian A, Mohan VR. Observations of Ethnomedicinal plants from Sirumalai Hills in Western Ghats of Tamil Nadu, India. *J. Herbal Med. Toxicol.* 2010; 4 (2): 89 - 92.
20. Gamble JS. *Flora of the Presidency of Madras, Vol. I – III*, Adlard & Son Ltd., (Reprinted. 1956). Botanical Survey of India, Calcutta, 1936.
21. Henry AN, Kumari GR, Chitra V. *Flora of Tamil Nadu, India, Series I: Analysis. Vol. II, Botanical Survey of India, Southern Circle, Coimbatore, 1987.*

22. Henry AN, Chithra V, Balakrishnan NP. Flora of Tamil Nadu, India, Series I: Analysis. Vol. III, Botanical Survey of India, Southern Circle, Coimbatore, 1989.
23. Henry AN, Chithra V, Balakrishnan NP. Flora of Tamil Nadu, India, Series I: Analysis. Vol. I, Botanical Survey of India, Southern Circle, Coimbatore, 1983.
24. Matthew KM. The Flora of Tamilnadu Carnatic. Vol. IRapinat Herbarium, Tiruchirapalli, Tamil Nadu, India (1983).
25. Chandrabose M, Nair NC. Flora of Coimbatore, Bishan Singh Mahendra Pal Singh, Dehra Dun, 1988.
26. Manickam VS, Irudayaraj V. Pteridophyte Flora of Nilgiris, South India. Bishen Singh Mahendra Pal Singh, Dehra Dun, 2003.
27. Ambasta SP. The Useful Plants of India. Council of Scientific and Industrial Research, New Delhi, 1986.