

Ethnobotanical Study of Medicinal Plants used by Kani Tribes of Mudavanpothai, Kanyakumari District, Tamil Nadu

J.C. Priya and *A. Anami Augustus Arul

Department of Botany, Holy Cross College (Autonomous), Nagercoil – 4.
Affiliated to Manonmaniam Sundaranar University, Tirunelveli – 627012

*Corresponding Author – Email: anamiaugustus@gmail.com

ABSTRACT

An ethnobotanical survey was carried out among the Kani tribes of Mudavanpothai hill, Kanyakumari wildlife sanctuary, Tamil Nadu. The present study was done through structured questionnaire in consultation with the tribal ethno-medicinal practitioners and has resulted in the documentation of 71 medicinal plants belonging to 38 families. The most commonly represented families were Acanthaceae, Apocynaceae and Fabaceae. Decoction was the most common preparation used in herbal recipes. The medicines are mainly administered to women and children. The study shows a high degree of ethnobotanical novelty and the use of plants among the Kani tribes reflects the revival of interest in traditional folk medicine.

Keywords: Ethnobotany, Folk medicine, Kani Tribes.

Introduction

Plants have always been a major component of the traditional system of healing in developing countries and have also been an integral part of the history and cultural practices of local communities [1,2]. The World Health Organization has recognized that 80 % of the world's population, especially in developing countries, depends on the traditional medicines derived from plants [2 - 4]. These medicines are regarded to be safe and economical due to the dearth of healthcare facilities [2,5].

The term “Ethnobotany” was coined by J. W. Harshberger in 1895 to indicate plants used by the aboriginals: from “ethno”- study of people and “Botany”- study of plants. Ethnobotany deals with the study and evaluation of plant-human relations in all phases and the effect of plant environment on human society [2,6]. Plant-based medicines enjoy a respectable position today, especially in the developing countries, where modern health service is limited [7,8]. Throughout history plants have been used by humans for medicinal purposes and even in modern times, have formed the basis of many pharmaceuticals [9,10]. The investigation of therapeutic plants through qualitative survey methods has become important in recent decades [11-14]. The records of traditional knowledge on medicinal plants have been considered to support the discoveries of new drugs for the advantage of mankind [15].

India has a rich tradition in medicinal plant study, and is one of twelve mega

biodiversity centers [16,17]. Totally there are 427 tribe communities in India [17,18]. In Tamil Nadu there are 36 scheduled tribes [17,19]. Kani are a tribal community found in the southern parts of Kerala and Tamil Nadu states in India. They dwell in forest or near to forest in Thiruvananthapuram and Kollam in Kerala and Kanyakumari and Tirunelveli districts in Tamil Nadu [20].

The objective of this study was to analyze the richness of ethnomedicinal plants used by the Kani tribes of Mudavanpothai and their traditional medical practices. Documentation of the indigenous knowledge of ethnomedicinal plants is important for the conservation of biological resources as well as their sustainable utilization.

Study area

Tamil Nadu is the eleventh largest states in India with a geographical area of 13005 Sq. Kms and lies between 11° 00' to 12° 00' North latitudes and 77° 28' to 78° 50' East longitudes [17,21].

The study was conducted among the Kani tribes inhabiting Mudavanpothai of Pechipparai Reserve Forest (08° 26.945' N; 077° 18.501' E), situated in the foothills of Kanyakumari Wildlife Sanctuary. Mudavanpothai is a mountain which is located at a latitude of 8.40383 and the longitude 77.37235 with the GPS coordinates of 08° 24' 13.75'' N and 77° 22' 20.45'' E with an elevation of 697 meters above the sea level. South-west monsoon from June- September and north-east monsoon in October to December bring rain to this region. The annual rainfall varies from 100 cms to 300 cms. Major portion of the rainfall is received during southwest monsoon. Alluvial soil is predominant in the entire area. The temperature fluctuates due to the elevation. The minimum and maximum temperature is 20.5 and 33.6°C respectively. The vegetation of the area comprises of tropical evergreen forests, wet grasslands and moist teak forests.

Methodology

Kani tribal traditional medicinal experts have been interviewed and the data have been collected. The useful parts, mode of preparation of the medicine, mode of administration and types of ailments cured by the traditional medicines were noted. The surrounding forested areas and agricultural land of villagers were surveyed with local herbal healers and knowledgeable elders for the identification of various plant species and their traditional uses. Plant specimens were collected for taxonomic identification from different parts of the study area. All the specimens collected were identified with the help of Holy Cross College Herbarium and with Flora of Presidency of Madras [22]. The prepared database contains following details of the plant such as the botanical name, family, local name, habit and ethnomedicinal uses. The semi-

structured questionnaire was used to extract information on types of ailments treated by the use of medicinal plants and plant parts used in treating the respective ailments (Questionnaire 1).

Results and Discussion

Plants have been used as traditional medicine for several thousand years. Kani tribal are primarily a semi-nomadic community, one of the primitive people who have been originated from Kerala. They have slowly shifted to Tamil Nadu and have been settled in the forest of Kanyakumari and Tirunelveli region. Tribal botanical knowledge is a divine gift to humanity. Tribals, even today depend on wild plants and animals for their livelihood [17].

An exploration of ethnomedicinal plants in Kani tribes of Mudavanpothai documented 71 species distributed in 66 genera belonging to 38 families. The families of the species are arranged in chronological order. Botanical name, family, local name, parts used and ethnomedicinal uses are described in the table given below (Table 1). Among the documented plants, herbs are present in higher number followed by trees, shrub, climber, small tree and semi-erect shrub (Table 1). As in herbs, the harvesting of leaves can be done without much effort. The leaf is the most commonly used part for medicinal purposes (Table 1). Leaves are easy to get and the preparation or decoction is also easy with leaves than any part of the plant. The most commonly represented families are Acanthaceae, Apocynaceae and Fabaceae (Figure 1). Among these 71 species, *Hemionitis arifolia* is the only plant belonging to the class Pteridophyte (Plate 1). The images of the rare and endemic species are included (Plate 1).

The list of remedies described in the present study was remarkably different from those reported in the neighboring tribes like Didayi tribes of Malkangiri district, Orissa [23], Kani tribes of Kottor reserve forest, Thiruvananthapuram, Kerala [24] and Paliyar tribals of Theni district [25].

Similarly, the remedies described in this study are found to be the same with the medicinal practices of nearby tribals like Kani tribes of Thachamalai hill, Kanyakumari [26] and Kani tribes of Pechipparai hills [2]. The usage of plants for the treatment of diseases varies from place to place. About 37% of the medicines are taken in the form of decoction, followed by raw consumption (20%), plant extract (18%), oil (14%) and topical application (11%) (Figure 2). Decoctions are easy to prepare and will not lose its active ingredients. The present study reveals that, most of the plants, nearly 54% are used for the treatment of women and children related diseases and remaining 46% are used for the treatment of adults both male and female. It shows the vulnerability of women and children, when the chance of going to hospital is impossible (Figure 3).

Figure 1. Relative Abundance of Top 10 herbal plant families in the study area

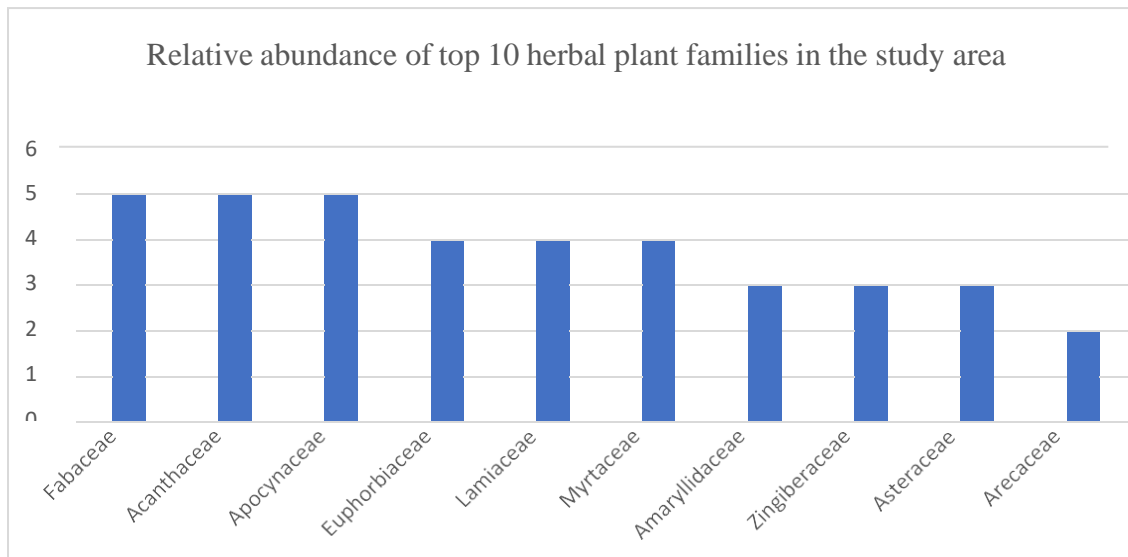


Figure 2. Mode of Application of Herbal Plants

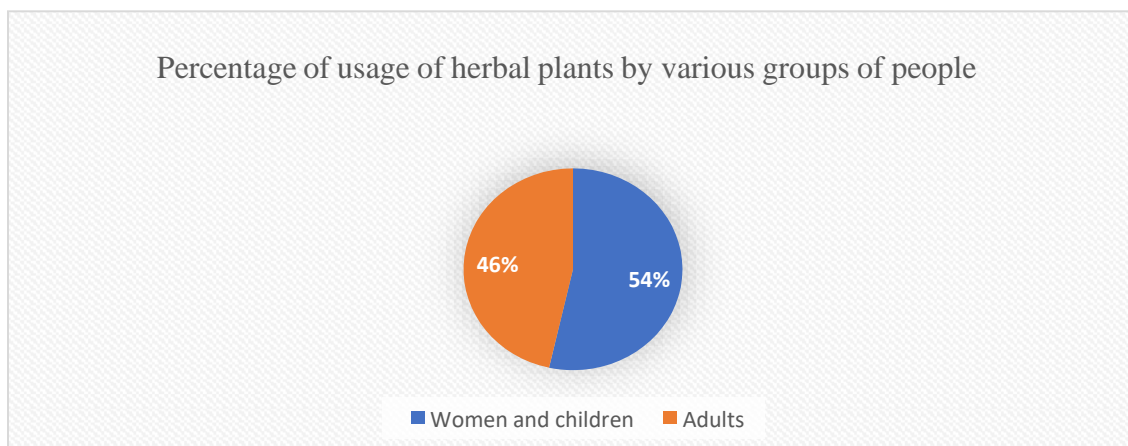
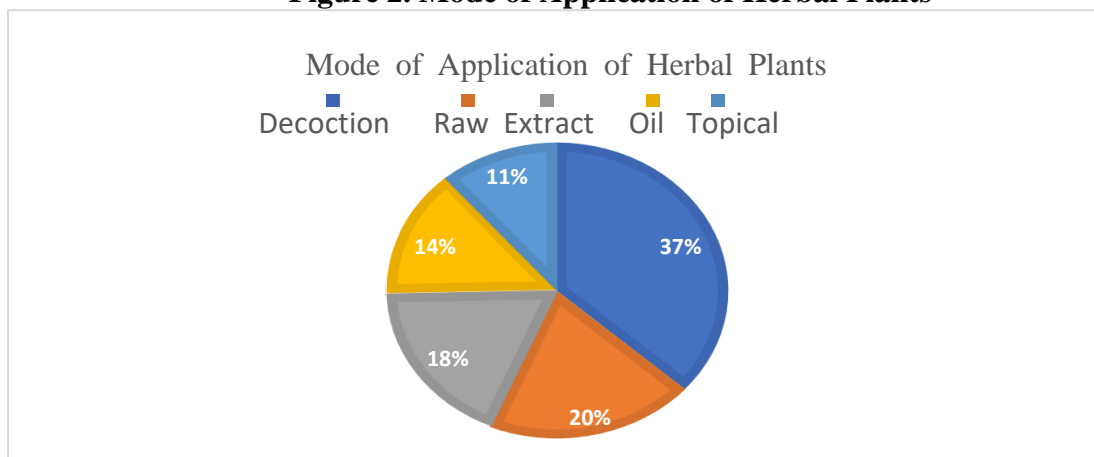


Figure 3. Percentage of usage of herbal plants by various groups of people

Questionnaire 1

1. Name the plant you use to treat the ailment?
2. What is the vernacular name of the plant?
3. How you have learned to recognize them?
4. Which plant part is used as medicine?
5. Can you explain the preparation in detail?
6. How long should the medicine be in-taken for recovery?
7. Internal or external administration?
8. How many times a day should the patient consume this medicine?
9. Whether they need to follow any diet plan?
10. To whom the medicine is administered? (Men/ women/children)

Table. 1 Medicinal plants and their uses

S. No	Botanical Name	Family	LocalName	Habit	Uses
1.	<i>Adathoda vasica</i> Nees.	Acanthaceae	Adhatoda	Shrub	The root decoction is used for the treatment of cold and fever.
2.	<i>Andrographis paniculata</i> (Burm.f.) Nees	Acanthaceae	Nilavembu	Herb	The decoction made from the whole plant is used for the treatment of fever and headache.
3.	<i>Justicia gendarussa</i> Burm.f	Acanthaceae	Karunochi	Shrub	The leaf is boiled with water and people with rheumatism can take bath with this water to get relief from the disease.
4.	<i>Justicia glauca</i> Rottl.	Acanthaceae	Thavasi murungai	Herb	The decoction made from the whole plant is consumed for the treatment of piles.
5.	<i>Strobilanthes alternata</i> (Burn.f.) Moylanex J.R.I. Wood	Acanthaceae	Karvi kurungi	Herb	The oil prepared by the addition of the leaves to coconut oil is applied topically to heal wounds.
6.	<i>Achyranthes aspera</i> L.	Amaranthaceae	Naayuruvi	Herb	The leaf decoction is used for the treatment of fever.
7.	<i>Allium cepa</i> L.	Amaryllidaceae	Ulli	Herb	The raw onion is consumed after meal for the reduction of bad cholesterol.
8.	<i>Allium sativum</i> L.	Amaryllidaceae	Veluthulli	Herb	The raw garlic is consumed for the treatment of stomach issues and indigestion.
9.	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Vallarai	Herb	The whole plant is added into coconut oil and this oil is used for the treatment of rashes and redness in infants.

10.	<i>Catharanthus roseus</i> (L.) G. Don	Apocynaceae	Sudukattu malligai	Herb	The decoction of the flower is consumed in the empty stomach for the treatment of ovarian cyst and other menstrual problems.
11.	<i>Hemidesmus indicus</i> (L.) R.Br.	Apocynaceae	Narnatti	Semi-erect shrub	The raw roots are consumed after removing the skin for the treatment of ulcer.
12.	<i>Pergularia daemia</i> (Forssk.) Chior.	Apocynaceae	Veliparuthi	Herb	The leaf extract is applied topically for the treatment of body pain for the pregnant women.
13.	<i>Rauvolfia serpentina</i> (L.) Benth. Ex Kurz	Apocynaceae	Sarpagandha	Herb	The dried roots are boiled in water and consumed for the treatment of poisonous bites.
14.	<i>Tabernaemontana divaricata</i> R. Br. ex Roem. & Schutt.	Apocynaceae	Nanthiyavattam	Shrub	The flower is crushed and the juice is dropped into the eyes for the treatment of eye disease.
15.	<i>Areca catechu</i> L.	Arecaceae	Paakku	Tree	The nut is powdered and it is consumed in the form of tea to expel intestinal worms.
16.	<i>Cocos nucifera</i> L.	Arecaceae	Tengku	Tree	The tea prepared from the dried and powdered shell is consumed in the empty stomach for the treatment of diabetes. The tender flower juice is consumed in the empty stomach for the treatment of kidney stone.
17.	<i>Asparagus racemosus</i> Willd.	Asparagaceae	Tannirvittan	Climber	The decoction prepared from the roots of this plant and leaves of <i>Centella asiatica</i> and <i>Ocimum sanctum</i> is used for the treatment of white discharge for both men and women.
18.	<i>Aloe vera</i> (L.) Burm.f	Asphodelaceae	Kathalai	Herb	The jelly present in the leaf is consumed raw for the treatment of menstrual problems. It is also topically applied over the heat burns.
19.	<i>Elephantopus scaber</i> L.	Asteraceae	Anashovadi	Herb	The decoction made from the whole plant is used for the treatment of injuries and wounds.
20.	<i>Spagneticola trilobata</i> (L.) Pruski	Asteraceae	Karisalankanni	Herb	The juice of the stem is gargled for the treatment of toothache.

21.	<i>Tridax procumbens</i> L.	Asteraceae	Muriampac halai	Herb	The leaf extract is applied topically over the cut wounds.
22.	<i>Basella alba</i> (L.)	Basellaceae	Pasalakeera	Herb	The leaf decoction is used for the treatment of constipation.
23.	<i>Ehretia microphylla</i> Lam.	Boraginaceae	Kattu vellilai	Shrub	The decoction made from the leaf of this plant and <i>Piper betel</i> is used in the treatment of cholera.
24.	<i>Heliotropium indicum</i> L.	Boraginaceae	ThekoduKKu	Herb	The decoction of the whole plant is used for the treatment of ulcer. The inflorescence paste is applied topically over the poisonous bites.
25.	<i>Carica papaya</i> L.	Caricaceae	Pappali	Tree	The tender leaf juice is consumed in empty stomach for the treatment of fever and to increase the blood count.
26.	<i>Terminalia chebula</i> Retz	Combretaceae	Kadukkai	Tree	The powdered seeds are consumed after meal for the treatment of constipation.
27.	<i>Momordia charantia</i> L.	Cucurbitaceae	Paagarkai	Climber	The decoction and juice made from the raw fruits are used for the treatment of diabetes.
28.	<i>Acalypha indica</i> L.	Euphorbiaceae	Kuppaimeni	Herb	The leaf extract is given to children for the treatment of cough. It is also mixed with leaf extract of <i>Vitex negundo</i> and breast milk and it is consumed for the removal of phlegm.
29.	<i>Croton tiglium</i> L.	Euphorbiaceae	Naervalam	Tree	The leaf decoction is used for the treatment of fever.
30.	<i>Euphoria hirta</i> L.	Euphorbiaceae	Amman pacharisi	Herb	Leaf juice is applied topically to heal wounds.
31.	<i>Jatropha curcus</i> L.	Euphorbiaceae	Kuruvetti	Shrub	The milk obtained from the plant is applied topically for the treatment of toothache.
32.	<i>Abrus precatorius</i> L.	Fabaceae	Athimaturam	Climber	The decoction of the root is consumed for the treatment of cold and cough.
33.	<i>Chamaecrista fasciculata</i> (Michx)Greene	Fabaceae	KaatuCassia	Herb	The decoction made from the leaves of this plant and <i>Ehretia microphylla</i> is used for the treatment of chicken pox and small pox.
34.	<i>Clitoria ternatea</i> L.	Fabaceae	Kannikkodi	Climber	The decoction made from the leaf is consumed for the treatment of ulcer.

35.	<i>Mimosa pudica</i> L.	Fabaceae	Thottac-curu ngi	Herb	The whole plant is added to coconut oil and it is applied topically for the treatment of eczema for infants.
36.	<i>Trigonella foenum- graecum</i> L.	Fabaceae	Venthayam	Herb	The decoction of the seeds are consumed for indigestion and it relieves heat from the body.
37.	<i>Curculigo orchioides</i> Gaertn	Hypoxidaceae	Nilappannai	Herb	The grounded rhizome is applied over the breast for the treatment of breast milk accumulation.
38.	<i>Eleutherinebulbosa</i> (Mill) Urb.	Irridaceae	Kaatu ulli	Herb	The paste made from the bulb is mixed with the human urine and consumed for the treatment of snake bite.
39.	<i>Coleus aromatics</i> Benth.	Lamiaceae	Karpuravalli	Herb	The leaf extract is consumed for the treatment of cold. It is also applied topically over the insect bites.
40.	<i>Ocimum sanctum</i> L.	Lamiaceae	Tulsi	Herb	Leaf juice is mixed with honey and consumed for the treatment of dry cough and cold.
41.	<i>Tectona grandis</i> L.f.	Lamiaceae	Thaekku	Tree	The tender leaf is added to the coconut oil and this oil is applied topically for the treatment of rashes and itching.
42.	<i>Vitex negundo</i> L.	Lamiaceae	Vennochi	Shrub	The decoction prepared from the leaf is consumed for the treatment of head injuries.
43.	<i>Lawsonia inermis</i> L.	Lythraceae	Maruthani	Shrub	The leaf paste is used as the medicine for foot crack.
44.	<i>Punica granatum</i> L.	Lythraceae	Maathulai	Small tree	The dried and powdered peel is mixed with honey and consumed for stomachache. The ripe fruits are consumed to increase the blood count.
45.	<i>Hibiscus rosa- sinensis</i> L.	Malvaceae	Sembarathi	Shrub	The leaf decoction is used as a natural shampoo and leaf paste is applied in the scalp for dandruff.
46.	<i>Azadirachta indica</i> A.Juss	Meliaceae	Veppai	Tree	The tender leaves are ground into a paste and consumed in empty stomach for the treatment of infertility and menstrual problems.
47.	<i>Moringa oleifera</i> Lam.	Moringaceae	Murungai	Tree	The tender leaf is consumed raw for the treatment of blood cholesterol.

48.	<i>Musa paradisiaca</i> L.	Musaceae	Vaazha	Herb	The juice of the pseudostem is consumed in empty stomach for the treatment of kidney stone.
49.	<i>Eucalyptus globulus</i> Labill	Myrtaceae	Thailamaram	Tree	The leaf is added to the coconut oil and it is applied topically for the treatment of cold and headache.
50.	<i>Psidium guajava</i> L.	Myrtaceae	Koyyaa	Tree	The tender leaf is consumed in the empty stomach for the treatment of indigestion. The leaf decoction is used for the treatment of diabetes.
51.	<i>Syzygium aromaticum</i> (L.)	Myrtaceae	Grambu	Tree	Clove oil is used for the treatment of toothache.
52.	<i>Syzygium cumini</i> (L.)	Myrtaceae	Naaval	Tree	The tea prepared from the powdered seeds are consumed in empty stomach for the treatment of diabetes.
53.	<i>Mirabilis jalapa</i> (L.)	Nyctaginaceae	Nalumani	Herb	The extract of the leaf is applied topically over the wounds and inflammation.
54.	<i>Biophytum sensitivum</i> (L.) DC.	Oxalidaceae	Mukkootti	Herb	The leaf is grinded with crystal salt and applied over the wasp sting area for the reduction of pain and inflammation.
55.	<i>Phyllanthus emblica</i> L.	Phyllanthaceae	Nelli	Tree	The fruit is mixed with honey and consumed in empty stomach for increasing the appetite.
56.	<i>Phyllanthus niruri</i> L.	Phyllanthaceae	Keezhanelli	Herb	The whole plant is boiled in water and it is consumed for the treatment of fever.
57.	<i>Piper betel</i> (L.)	Piperaceae	Vettilai	Climber	The leaf decoction is consumed for the treatment of whooping cough and asthma.
58.	<i>Piper nigrum</i> L.	Piperaceae	Kurumilagu	Shrub	The dry fruits are grounded with palm jaggery and consumed for the treatment of cold.
59.	<i>Hemionitis arifoila</i> (Burm.f.) T.Moore	Pteridaceae	Kambi thamarai	Herb	The leaf is squeezed along with small onion and this extract is dipped in milk and a single drop is applied in the eyes for the treatment of eye infection.
60.	<i>Ixora coccinea</i> L.	Rubiaceae	Thetti	Shrub	The flowers of <i>Ixora coccinea</i> and whole plant of <i>Portulaca quadrifolia</i> is added to coconut oil and it is applied topically for the treatment of rashes, eczema.

					and redness for children and adults.
61.	<i>Citrus limon</i> (L.) Osbeck Modernism	Rutaceae	Azhumichai	Small tree	Fruit juice is mixed with salt and consumed for the treatment of dysentery.
62.	<i>Murraya koenigii</i> (L.) Sprengel	Rutaceae	Curry veppilai	Small tree	The leaf paste is applied over dog bite area in the body.
63.	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Mutakkottan	Climber	The whole plant is made into a paste and applied all over the body to reduce the spasm and strain of pregnant women.
64.	<i>Scoparia dulcis</i> L.	Scrophulariaceae	Chirarita	Herb	The decoction made from the root is used for the treatment of stomach ache.
65.	<i>Capsicum frutescens</i> L.	Solanaceae	Kanthari milagu	Herb	Fruit is consumed for the treatment of cholesterol. The fruit is mixed with palm jaggery for the treatment of fever and cold.
66.	<i>Solanum nigrum</i> L.	Solanaceae	Manathakkali	Herb	The decoction prepared from the whole plant is used for the treatment of ulcer.
67.	<i>Lantana camara</i> L.	Verbenaceae	Arasimala	Shrub	Leaf paste is mixed with lime and is applied topically over the wounds.
68.	<i>Cissus quadrangularis</i> L.	Vitaceae	Pirandai	Climber	The stem is added to coconut oil and it is applied topically for the treatment of body pain.
69.	<i>Alpinia galanga</i> (L.) Willd	Zingiberaceae	Paereeyarat hai	Herb	The rhizome of this plant and seed of <i>Areca catechu</i> is added to coconut oil and it is applied topically for the treatment of heat burns.
70.	<i>Curcuma longa</i> L.	Zingiberaceae	Manjal	Herb	The powdered rhizome is mixed with honey and consumed for the treatment of cold and for the removal of phlegm. The powder is also applied topically for insect bite.
71.	<i>Zingiber officinale</i> Roscoe.	Zingiberaceae	Inji	Herb	The decoction of the rhizome is used for the treatment of acidity and indigestion.

Plate 1. Rare and endemic medicinal plants of the study area

Hemionitis arifoila (Burm.f.) T. Moore



Hemidesmus indicus (L.) R.Br.



Eleutherine bulbosa (Mill) Urb.



Strobilanthes alternata (Burn.f.)
Moylan ex J.R.I. Wood



Curculigo orchioides Gaertn



Rauvolfia serpentina (L.) Benth. ex Kurz

 <p><i>Ehretia microphylla</i> Lam.</p>	 <p><i>Chamaecrista fasciculata</i> (Michx) Greene</p>
 <p><i>Biophytum sensitivum</i> (L.) DC.</p>	 <p><i>Elephantopus scaber</i> L.</p>
 <p><i>Justicia gendarussa</i> Burm.f</p>	 <p><i>Croton tigilum</i> L.</p>

Summary

Thus, the present study helped us to understand the ethno medicinal knowledge of Kani tribes of Mudavanpothai. The documentation is essential to preserve their botanical knowledge. Further, they have to be trained and awareness should be given for the conservation of the biodiversity of this area. Over exploitation and loss of natural habitat etc. is the major factors that are responsible for the exploitation of the medicinal plants. Traditional uses of plants are declining as the younger generation is not interested in traditional practices. So, it is very important to protect the medicinal plants and valuable traditional practices.

Acknowledgement

The authors are grateful to Mr. Murugan and Mrs. Kunzhamma and other Kani tribals

for sharing their indigenous knowledge throughout the field study, without their participation this research would not have been possible.

References

1. Rajalakshmi S., Vijayakumar S., Arulmozhi P. Ethnobotanical survey of medicinal plants in Thanjavur and its surrounding (Tamil Nadu- India). *Acta Ecologica Sinica*. 2015; 173.
2. Sukumaran S., Sujin R.M., Geetha V.S., Jeeva S. Ethnobotanical study of medicinal plants used by the Kani tribes of Pechiparai Hills, Western Ghats, India. *Acta Ecologica Sinica*. 2019; 41(5): 365 - 376.
3. WHO. Traditional Medicine. Fact Sheet. 2008; <http://www.who.int/mediacentre/factsheets/fs134/en/>.
4. Singh A.G., Kumar A., Tewari D.D. An ethnobotanical survey of medicinal plants used in Terai Forest of Western Nepal. *Journal of Ethnobiology and Ethnomedicine*. 2012; 8(19): 1 - 14.
5. Ahmed M.J., Akhtar T. Indigenous knowledge of the use of medicinal plants in Bheri, Muzaffarabad, Azad Kashmir, Pakistan. *European Journal of Integrative Medicine*. 2016; 8: 560 - 569.
6. Sharma H., Kumar A. Ethnobotanical studies on medicinal plants of Rajasthan (India): A review. *Journal of Medicinal Plants Research*. 2011; 5(7): 1107 - 1112.
7. Katewa S.S., Chaudhary B.L., Jain Z. Folk herbal medicines from tribal area of Rajasthan, India. *Journal of Ethnopharmacology*. 2004; 92: 41 – 46.
8. Abbasi A.M., Khan M.A., Ahmad M., Qureshi R., Arshad M., Jahan S., Zafar M., Sultana S. Ethnobotanical study of wound healing herbs among the tribal communities in Northern Himalaya Ranges district Abbottabad, Pakistan. *Pakistan Journal of Botany*. 2010; 42(6): 3747 - 3753.
9. Schmidt B., Ribnicky D.M., Poulev A., Logendra S., Cefalu W.T., Raskin I. A natural history of botanical therapeutics. *Metabolism*. 2008; 57(1): 3 - 9.
10. Rahmatullah M., Mukti I.J., Haque A.K.M.F., Mollik A.H., Parvin K., Jahan R., Chowdhury M.H., Rahman T. An ethnobotanical survey and pharmacological evaluation of medicinal plants used by the Garo tribal community living in Netrakona district, Bangladesh, *Advances in Natural and Applied Sciences*. 2009; 3(3): 402 - 418.
11. Kayani S., Ahmad M., Zafar M., Sultana S., Khan M.P.Z., Ashraf M.A., Hussain J., Yaseen G. Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies – Abbottabad, Northern Pakistan. *Journal of Ethnopharmacology*. 2014; 156: 47 - 60.
12. Ahmad K.S., Hamid A., Nawaz F., Hameed M., Ahmad F., Deng J., Akhtar N., Wazarat A., Mahroof S. Ethnopharmacological studies of indigenous plants in Kel village, Neelum Valley, Azad Kashmir, Pakistan. *Journal of Ethnobiology and Ethnomedicine*. 2017; 13(68): 1 – 16.
13. Ong H.G., Kim Y.D. Quantitative ethnobotanical study of the medicinal plants used by the Ati Negrito indigenous group in Guimaras Island, Philippines. *Journal of Ethnopharmacology*. 2014; 157: 228 - 242.
14. Sulaiman., Shah S., Khan S., Bussman R.W., Ali M., Hussain D., Hussain W. Quantitative Ethnobotanical study of indigenous knowledge on medicinal plants used by the tribal

- communities of Gokand Valley, district Buner, Khyber Pakhtunkhwa, Pakistan. *Plants*. 2020; 9: 1001.
15. Prakash R. Medicinal plants used by tribal communities: A study of Uttarakand Himalayan Region. *Journal of Humanities and Social Science*. 2015; 4(2): 55 - 61.
 16. Ravikumar K., Ved D.K., Vijayasankar R., Udayan P.S. 100 Red listed medicinal plants of conservation concern in South India. *Foundation for Revitalization of Local Health Traditions: Bangalore*. 2007.
 17. Britto J.D., Mahesh R. Exploration of Kani Tribal Botanical Knowledge in Agasthiayamalai Biosphere Reserve – South India. *Ethnobotanical leaflets*. 2007; 11: 258 - 265.
 18. Kala C.P. Ethnomedicinal botany of the Apatani in the Eastern Himalayas region of India. *Journal of Ethnobiology and Ethnomedicine* 2005; 1(11): 1 - 8
 19. Prasanna K.S., Pitamber P.D. Gender in the management of indigenous knowledge: reflection from Indian central Himalaya. *Current science*. 2006; 91(1): 104 - 108.
 20. <https://en.m.wikipedia.org/wiki/kanikkaran>
 21. Annamalai R., Tamil Nadu biodiversity strategy and action plan – Forest Biodiversity. Tamil Nadu Forest Department, Government of Tamil Nadu – Chennai. 2004.
 22. Gamble J.S., Fischer C.E.C. Flora of the Presidency of Madras. *Botanical survey of India*. 1957; 1 - 3.
 23. Pattanaik C., Reddy C.S., Murthy M.S.R. An ethnobotanical survey of medicinal plants used by the Didayi tribe of Malkangiri district of Orissa, India. *Fitoterapia*. 2007; 79(1): 67 - 71.
 24. Vijayan A., Liju V.B., John R.J.V., Parthipan B., Renuka C. Traditional remedies of Kani tribes of Kottor reserve forest, Agasthyavanam, Thiruvananthapuram, Kerala. *Indian Journal of Traditional Knowledge*. 2007; 6(4): 589 - 594.
 25. Ignacimuthu S., Ayyanar M., Sankarasivaraman K. Ethnobotanical study of medicinal plants used by Paliyar tribals in Theni district of Tamil Nadu, India. *Fitoterapia*, 2008;79: 562 - 568.
 26. Divya V.V., Karthick N., Umamaheshwari S. Ethnopharmacological studies of the medicinal plants used by Kani tribes of Thachamalai hill, Kanyakumari, Tamil Nadu, India. *International Journal of Advanced Biotechnology Research*. 2013; 3(3): 384 - 393.