

Ethnomedicinal Knowledge among the Local Communities in the Kodaikanal Foothills of the Southern Western Ghats in Tamil Nadu, India

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<p>Abstract: India has a rich history of traditional medicine, including Ayurveda, Siddha, and Folk medicines. The Folk system, although not extensively documented, is widely practiced by native communities, with valuable knowledge passed down orally through generations. We carried out an ethnobotanical study from June 2022 to December 2023 in six settlements at the foothills of Kodaikanal, within the Devadanapatti block, an underexplored and biodiversity-rich region in the Western Ghats. The research sought to identify knowledgeable Paliyar tribes and traditional healers in the Kodaikanal foothills of Devadanapatti block in Theni District and document their ethnomedicinal knowledge through open and semi-structured face-to-face interviews. A comprehensive cataloging effort identified 113 plant species spanning 100 genera and 46 families, used for treating various ailments ranging from headaches and skin diseases to kidney stones and viral infections. The most represented families were Fabaceae, Apocynaceae, Amaranthaceae and Solanaceae. The traditional healers stated that the availability of several native medicinal plants, including <i>Acorus calamus</i>, <i>Aegle marmelos</i>, <i>Albizia lebbeck</i>, <i>Phyla nodiflora</i>, <i>Sphagneticola calendulacea</i>, <i>Tabernaemontana divaricata</i> and <i>Thespesia populnea</i> have declined over the years due to over-exploitation. The utilization of plants by local communities underscores their interest in herbal medicine. Further investigations into the pharmacological properties of previously unstudied species may lead to the discovery of novel bioactive compounds.</p>	<p style="text-align: center;">Research Paper</p>
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INTRODUCTION

Since ancient times, plants have been invaluable to humanity, providing nourishment and curing diseases from the dawn of life on Earth. Globally, about 85% of traditional medicines used in primary healthcare are derived from plants (Farnsworth, 1988). Ethnobotanical data is essential for systematic research, particularly when fieldwork data is accurately evaluated (Awadh *et al.*, 2004). Therapeutic plants have a long-standing history in numerous ethnic communities and continue to provide valuable resources for treating various ailments (Goleniowski *et al.*, 2006). The use of traditional remedies is grounded in centuries of trust and empirical observations, predating the development and expansion of modern medicine. In developing rural areas, there is an increasing effort to integrate traditional medicine, especially herbal preparations, into local healthcare systems. Furthermore, the modernized public is increasingly turning to herbal medicine (Njoroge & Bussmann, 2007; Wondimu *et al.*, 2007).

India boasts a rich heritage and diverse cultural tapestry of traditional medicinal practices, including Ayurveda, Siddha, Unani, and folk medicine. These holistic systems prioritize the utilization of various herbal remedies to foster wellness and address ailments. In rural and certain urban regions of India, medicinal plants remain a cornerstone of healthcare. A significant portion of the population depends on traditional herbal treatments for their therapeutic benefits. These age-old remedies are often handed down through generations and are deeply embedded in the nation's cultural ethos. India's traditional medicinal systems acknowledge the healing virtues of numerous plants, believed to possess various therapeutic properties and used to treat an array of conditions.

In recent times, there has been a resurgence of interest and acknowledgment of traditional medicinal plants in India. Significant efforts are underway to document and scientifically validate the efficacy of these

plants through research and clinical studies. Traditional medicinal plants continue to be extensively used and appreciated in India for both their historical importance and their potential in offering natural healthcare solutions. Moreover, over a hundred published documents and several unpublished reports detail ethnomedicinal claims among the diverse ethnic communities in Tamil Nadu (Jeyaprakash *et al.*, 2011).

A review of the literature indicates that ethnomedicinal research on the Paliyar tribes and other rural communities in Tamil Nadu has been documented in several nearby districts, including Madurai (Ignacimuthu *et al.*, 2006; Boomibalagan *et al.*, 2013), Sivagangai (Suresh *et al.*, 2012; Shanmugam *et al.*, 2012), Tirunelveli (Ayyanar & Ignacimuthu, 2011), Virudhunagar (Arinathan *et al.*, 2003; Muthukumarasamy *et al.*, 2003a & b; Rajendran *et al.*, 2002 & 2003; Ganesan *et al.*, 2005), and Dindigul (Ganesan *et al.*, 2005; Sivasankari *et al.*, 2014). However, Theni District remains underexplored from an ethno-botanical perspective, with only recent studies by Ignacimuthu *et al.*, (2008), Ayyanar *et al.*, (2010), Jeyaprakash *et al.*, (2011), Pandikumar *et al.*, (2010), and Mehalingam and Elango (2017). This comprehensive review highlights a gap in the detailed ethnobotanical analysis of medicinal flora used by the tribal and rural communities in the foothills of Kodaikanal, Devadanapatti block, Theni district, Tamil Nadu, India. Consequently, this study was undertaken to provide in-depth information on the plants traditionally utilized by the Paliyar tribes and other rural inhabitants.

MATERIALS AND METHODS

Geographical Location of the Study Area

The settlements within the Devadanapatti area in Periyakulam Taluk, Theni District encompass the study sites in Devadanapatti block: 1. Manjalar Dam, 2. Rasimalai colony (a Paliyar tribal settlement), 3. Gandhi Nagar, 4. Mungilanai Kamatchi Amman temple, 5. Kamakkapatti, and 6. Amsapuram. These locations are situated between 10° 10' and 10° 11' North latitude and 77° 37' and 77° 40' East longitude (Fig. 1). The villages are positioned at the base of the Kodaikanal Hills of the Western Ghats. The ancient Sri Munkilanai Kamatchi Amman Kovil temple is one of the primary and significant shrines in Devadanapatti.

Description of the Study Area

The study area falls within the dry deciduous forest zone. Comprehensive fieldwork was carried out within Devadanapatti block which includes the following villages inhabited by various settled communities nestled

in the foothills of Kodaikanal. Among these, the Paliyar tribe is a notable ethnic group, and rural (non-indigenous) communities are also found through field surveys in this region. Their settlement is located at an elevation of 300 meters above sea level. The traditional healers, known as the Vaidhyars, are the experts who possess knowledge of medicinal plants and practice traditional medicine in the region.

Ethnobotanical Investigations

The fieldwork includes plant collection and ethnobotanical studies, followed by laboratory examinations and data analysis. Standard methodologies developed by Jain (1964) were employed for plant collection, characterization, and data analysis. A comprehensive list of all published materials related to the study area was compiled using online resources and other pertinent literature gathered through consultations with various libraries. Floras, historical literature relevant to the study area, and different herbaria were reviewed to obtain location information.

Interview with the Indigenous and Non-Indigenous Communities

Experienced indigenous and non-indigenous community people, possessing extensive knowledge of herbal medicine, were identified based on their expertise, by regular field visits, and interviews with local people and other traditional practitioners. The attributes of informants were verified and documented through personal interviews with 27 participants in the research area. Among them, five were ethnic individuals; one was a native tribal healer, and twenty-one were non-indigenous folks with considerable knowledge. The age range of the interviewed informants was between 56 and 85. Data collection involved surveys and discussions conducted with participants in their native language (Tamil). Our survey provided insights into the recommended flora, the parts used, therapeutic applications for each part, preparation methods and forms (such as infusion, ointment, powder, and extract), modes of administration, and the incorporation of plants as ingredients. Each plant material was assigned a unique collection number and recorded with its botanical name, indigenous name, used parts, applications, and other notes. All details were meticulously and accurately documented in the field notebook. The collected information was validated by senior traditional practitioners in various villages and communities within the study area. The preserved plants were identified using the Flora of the Tamil Nadu Carnatic (Matthew, 1983) Voucher specimens were stored in the herbarium at the Institute of Natural Science Research, Devadanapatti, Theni District.

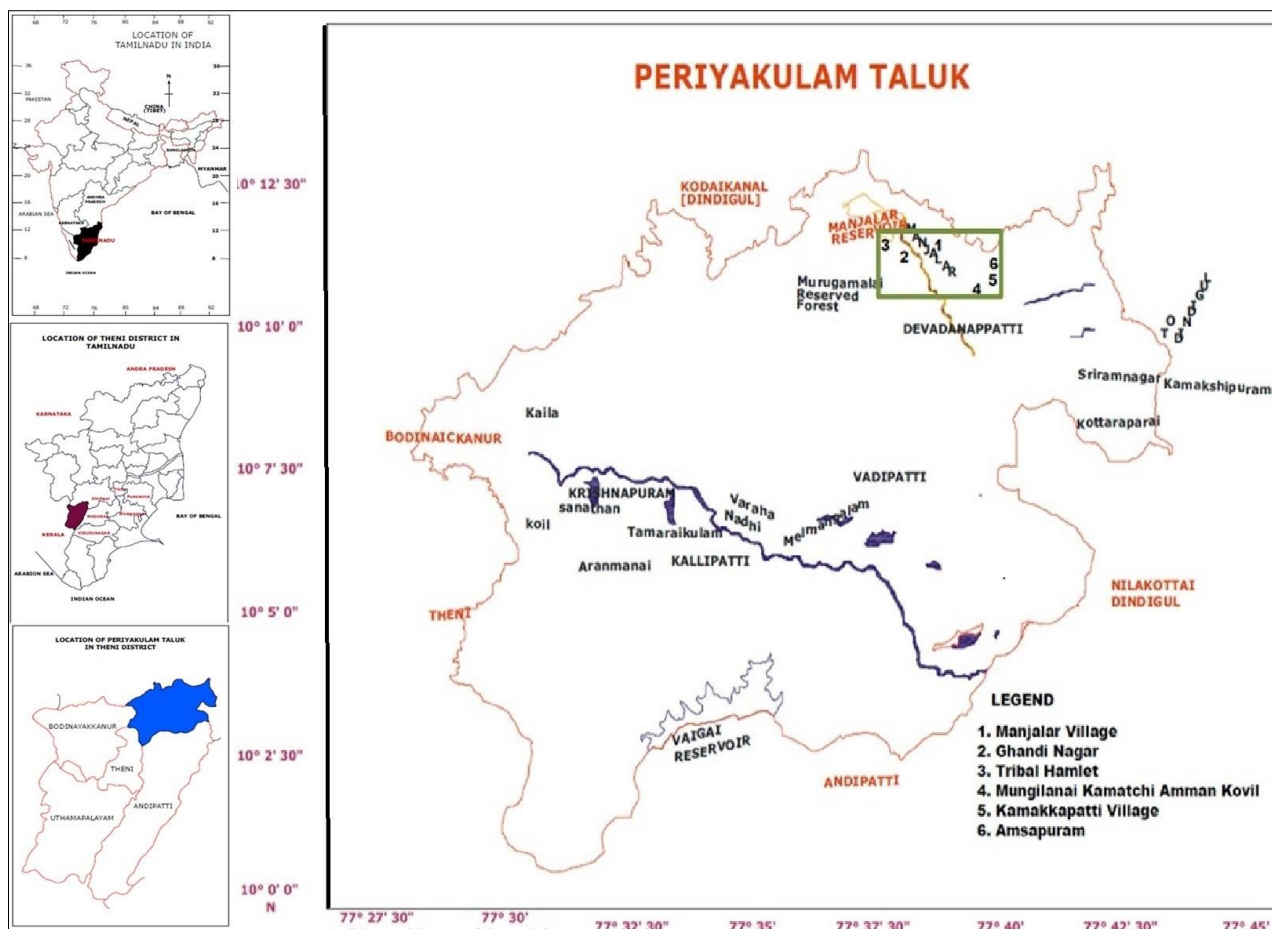


Fig. 1: Location map of the study area

RESULTS AND DISCUSSION

Participant Demographics

On the 27 individuals interviewed, 23 were male and 4 were female actively practicing traditional medicine. This gender imbalance is mainly because fewer women in the study area are interested in practicing herbal remedies (Table 1). In many previous ethnobotanical studies, male informants have been more prominent than their female counterparts (Jeyaprakash *et al.*, 2011; Ayyanar & Ignacimuthu, 2011; Sivasankari *et al.*, 2014).

The participants in this study acquired their knowledge from predecessors, family members, neighbors, and other sources. The expertise in medicinal plants shared by proficient traditional healers and local people varies considerably, owing to the different methods of inheriting medicinal knowledge from their ancestors. Most of the individuals interviewed are educated, although some have only completed primary or middle school. Professional healers treat patients free of charge but are open to accepting monetary compensation if offered.

Table 1: Participant demographics

Demographic profile	No. of informants		
Characteristics	Female	Male	Total (27)
Traditional healer (Vaidhyar)	-	1	1
Local people (Agriculturists, agricultural laborers, Paliyar tribes, and shepherds)	5	21	26
Age			
56 – 65	1	8	9
66 – 75	2	8	10
76 – 85	2	6	8
Education level			
8 th grade	0	1	1
7 th grade	0	1	1
6 th grade	0	5	5
5 th grade	3	10	13
Unschooler	2	5	7

Medicinal plant diversity and their uses

The utilization of herbaceous plants among indigenous communities is a direct consequence of the abundance of botanical resources in their surroundings (Sivasankari *et al.*, 2014; Giday *et al.*, 2010). In the present study, 113 plant species belonging to 100 genera and 46 families were documented to be used for the treatment of various conditions. Fabaceae (10 species), Apocynaceae (8 species), Amaranthaceae and Solanaceae (7 species each), were the most represented families, followed by Acanthaceae and Cucurbitaceae (5

species each), Asteraceae, Liliaceae, Malvaceae and Verbenaceae (4 species each), Euphorbiaceae and Rutaceae (3 species each). Nine families viz. Araceae, Combretaceae, Convolvulaceae, Lamiaceae, Meliaceae, Poaceae, Sapindaceae, Vitaceae and Zygophyllaceae were recorded with two species each and 25 other families represented by one species each. Among the recorded ethnomedicinal plants, herbs (52 species) were the most prevalent, followed by shrubs (23 species), climbers (21 species) and trees (17 species).

Table 2: Medicinal plants and their ethnobotanical uses recorded during this study

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
Acanthaceae	<i>Andrographis paniculata</i> (Burm. f.) Wall. ex Nees	INSciR-00252	Herb	Nilavembu	Fever	Fresh leaf decoction is taken thrice daily for two days to reduce fever.
	<i>Andrographis alata</i> (Vahl.) Nees	INSciR-0548	Herb	Nilavembu	Poisonous bites	Fresh leaf decoction is taken orally three times a day for 2-3 days to treat venomous stings.
	<i>Blepharis maderaspatensis</i> (L.) B. Heyne ex Roth	INSciR-0438	Herb	Nenthirapoondu	Eye disorder	Leaf extract, 2-3 drops used daily, to cure eye discomfort.
	<i>Hygrophila auriculata</i> (Schum.) Heine	INSciR-500	Herb	Neermulli	Blood purification	An infusion from the herb is consumed in the morning for 48 days to purify the blood.
	<i>Justicia adhatoda</i> L.	INSciR-0507	Shrub	Adhatodai	Cold and cough	A decoction made from fresh leaves is consumed for a week to reduce cold and cough.
	<i>Ruellia tuberosa</i> L.	INSciR-0514	Herb	Kiranthi Nayagam	Skin diseases	Herbal poultice is used topically until healing for skin diseases
Amaranthaceae	<i>Achyranthes aspera</i> L.	INSciR-0072	Herb	Nayuruvi	Toothache	Fresh root is used as a chewing stick

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
						to cure tooth pain.
	<i>Aerva lanata</i> (L.) Juss.	INSciR-0064	Herb	Siru peelai	Kidney stone	Herbal infusion is consumed thrice daily for kidney stone treatment.
	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	INSciR-0515	Herb	Ponnaganni	Eye disorder	Cooked leaves are eaten to cure eye disorders
	<i>Amaranthus caudatus</i> L.	INSciR-0519	Herb	Thandu-keerai	Ulcer	An infusion of leaves is taken orally twice a day for three days for ulcer
	<i>Amaranthus spinosus</i> L.	INSciR-0520	Herb	Mullu-thandu Kerai	Indigestion	Steeped and sautéed foliage ingested orally twice daily for three days for indigestion.
	<i>Amaranthus viridis</i> L.	INSciR-0074	Herb	Kuppai keerai	Dysentery	An infusion of fresh leaves is taken orally twice a day for three days for dysentery.
	<i>Pupalia lappacea</i> (L.) Juss.	INSciR-0503	Herb	Aadai-otti	Ulcer	The leaves are fried in gingelly oil and taken orally to cure ulcer
Apocynaceae	<i>Calotropis gigantea</i> (L.) Dryand.	INSciR-0524	Shrub	Erukku	Cuts and wounds, feet irritation, and exorcism	Latex is used to cure cuts and wounds. At night, a cloth with a leaf is placed under the foot to relieve irritation caused by diabetes. The stem and leaves are also used in traditional exorcism.
	<i>Caralluma adscendens</i> var.	INSciR-0065	Herb	Koliseliman	Obesity	Fresh tender stems are

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
	<i>attenuata</i> (Wight) Grav. & Mayur.					eaten for obesity.
	<i>Wrightia antidysenterica</i> (L.) R.Br.	INSciR-0509	Shrub	Erukalaipalai	Psoriasis	Leaf paste is applied externally to cure psoriasis
	<i>Carissa carandas</i> L.	INSciR-00324	Shrub	Kalakai	Edible	Fruits are edible
	<i>Gymnema sylvestre</i> (Retz.) R.Br. ex Roem. & Schult.	INSciR-00236	Climber	Siru-kurinjan	Diabetes	Fresh leaves are taken twice daily on an empty stomach for 10-15 days to cure diabetes
	<i>Pentatropis capensis</i> (L. fil.) Bullock	INSciR-0510	Climber	Upplangodi	Dysentery	The leaves are gently heated, and the juice is squeezed out and mixed with breast milk and given to children to cure diarrhea
	<i>Pergularia daemia</i> (Forsk.) Choiv.	INSciR-0488	Climber	Velipparuthi	Fever	Juice made from fresh leaves is taken with honey thrice a day to cure fever
	<i>Sarcostemma acidum</i> (Roxb.) Voigt	INSciR-0237	Climber	Kodi-kalli	Cuts and wounds	Stem latex is applied to cure cuts and wounds
	<i>Tabernaemontana divaricata</i> R.Br. ex Roem. & Schult.	INSciR-0511	Shrub	Nanthiyavattai	Eye disorder	Petals are placed on the eyelid to cool the eye
Araceae	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicol.	INSciR-0501	Herb	Karunai kilangu	Piles	The rhizome is used as food and to cure piles
	<i>Acorus calamus</i> L.	INSciR-0533	Herb	Vasambu	Toothache	Crushed rhizome is applied to the tooth for 2-3 days to alleviate tooth pain.
Areaceae	<i>Borassus flabellifer</i> L.	INSciR-0543	Tree	Panai	Boils	The fruit jelly is applied on boils

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
Aristolochiaceae	<i>Aristolochia indica</i> L.	INSciR-0050	Climber	Easwaramooli / Perumarunthu	Poisonous bites	The root bark decoction is consumed on an empty stomach twice daily for 2-3 days for poisonous bites.
Asteraceae	<i>Eclipta prostrata</i> (L.) L.	INSciR-0070	Herb	Karisalai	Hair fall	Leaf paste is applied on hair ½ an hour prior to bath to stop hair fall.
	<i>Kleinia grandiflora</i> (Wall. ex. DC.) N.Rani.	INSciR-0247	Herb	Muyalkathu ilai	Pimples	Leaf paste is applied on pimples until cure.
	<i>Tridax procumbens</i> L.	INSciR-489	Herb	Vettukayapundu	Cuts and wounds	Fresh leaf paste is applied on the cuts and wounds to expedite healing.
	<i>Wedelia chinensis</i> (Osbeck) Merr.	INSciR-0547	Herb	Manjal-karisalai	Toothache	Fresh leaf paste is used as toothpaste to get relief from toothache
Caricaceae	<i>Carica papaya</i> L.	INSciR-0525	Tree	Pappali	Viral fever	An herbal infusion is combined with Nilavembu (<i>Andrographis paniculata</i>) decoction and is given for 2-3 days to treat viral fever.
Cleomaceae	<i>Cleome gynandra</i> L.	INSciR-0490	Herb	Thaivelai.	Wounds and swellings	Fresh foliage is transformed into a paste and administered topically on wounds and swellings.
Combretaceae	<i>Anogeissus latifolia</i> (DC.) Wall. ex Bedd.	INSciR-0449	Tree	Vekkali	Cuts and wounds	The root is pounded and securely bandaged to expedite

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
						recovery from cuts and wounds.
	<i>Terminalia arjuna</i> (DC.) Wight & Arn.	INSciR-00300	Tree	Maruthamaram	Blood pressure	A decoction made from the bark and Semparathai (<i>Hibiscus rosa-sinensis</i>) petals is taken orally daily for blood pressure.
Convolvulaceae	<i>Evolvulus alsinoides</i> (L.) L.	INSciR-0052	Herb	Vishnukranthai	Fever	The whole plant decoction with <i>Ocimum sanctum</i> leaves is given for fevers accompanied by diarrhea.
	<i>Rivea hypocrateriformis</i> (Desr.) Choisy.	INSciR-0039	Climber	Pothikeerai	Body weakness	Fresh young leaves are consumed as a vegetable to enhance physical vitality.
Cucurbitaceae	<i>Citrullus lanatus</i> (Thunb.) Matsum & Nakai	INSciR-0544	Climber	Kumattikai	Rheumatism	A heated fruit poultice with neem oil extract is applied and secured with a cloth over the affected areas for 3-5 days.
	<i>Coccinia grandis</i> (L.) Voigt	INSciR-0097	Climber	Kovakodi	Piles	Matured fruit is consumed orally twice daily for a month to alleviate hemorrhoid.
	<i>Corallocarpus epigaeus</i> (Rottler) Hook.f.	INSciR-0402	Climber	Kollangkovai	Poisonous bites	Juice is extracted from the tuber and applied on the bite.
	<i>Mukia maderaspatana</i> (L.) M. Roemer	INSciR-0198	Climber	Musumusukkai	Throat infection	Fresh foliage is made into a paste and ingested orally to alleviate

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
						throat infection.
	<i>Solena amplexicaulis</i> (Lam.) Gandhi	INSciR-0505	Climber	Kal-kovai	Cuts and wounds	Fresh leaf paste is applied externally on the affected area for 2-3 days.
Cyperaceae	<i>Cyperus rotundus</i> L.	INSciR-0528	Herb	Korai	Fever	Fresh tubers are processed into a paste and consumed orally together with honey.
Dioscoreaceae	<i>Dioscorea pentaphylla</i> L.	INSciR-0315	Climber	Norankilangu	Piles	Fresh tubers are simmered with water and salt and ingested.
	<i>Dioscorea tomentosa</i> J.König ex Spreng.	INSciR-0001	Climber	Vallikilangu	Edible	Fresh tubers are edible
Euphorbiaceae	<i>Acalypha indica</i> L.	INSciR-0529	Herb	Kuppameni	Skin diseases	The juice of the crushed leaves applies externally.
	<i>Euphorbia hirta</i> L.	INSciR-0448	Herb	Amman-pacharisi	Warts	Stem latex is applied externally on warts.
	<i>Euphorbia tirucalli</i> L.	INSciR-0526	Shrub	Kommbu-kalli	Cuts & wounds and wart	The milky latex is applied externally
Flacourtiaceae	<i>Flacourtia indica</i> (Burm.f.) Merr.	INSciR-0504	Shrub	Soththaikala	Skin diseases	Root paste is applied on affected places until cure
Lamiaceae	<i>Leucus aspera</i> (Willd.) Link	INSciR-0077	Herb	Thumbai	Skin diseases	Herbal poultice is administered to the affected area twice daily for a duration of two days
	<i>Ocimum tenuiflorum</i> L.	INSciR-0424	Herb	Thulasi	Cold and cough	Herbal concoction with honey is consumed orally twice daily for alleviating

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
						cold and cough
Leguminosae	<i>Albizia amara</i> (Roxb.) Boiv.	INSciR-0491	Tree	Arappu-maram	Dandruff	Fresh leaves are ground and mixed with rice flour, then applied to the hair before bathing for a week to get rid
	<i>Albizia lebbek</i> (L.) Benth.	INSciR-0492	Tree	Vaagai	Furniture	Timber is used as oil pressing wood
	<i>Bauhinia variegata</i> L.	INSciR-0531	Shrub	Mantharai	Eye disorder	Petals are placed on the eye lid to make eye cool
	<i>Clitoria ternatea</i> L.	INSciR-0197	Climber	Sanguppoo	Herbal tea	Petals are used to prepare herbal tea
	<i>Desmodium gangeticum</i> (L.) DC.	INSciR-0545	Herb	Pulladi	Asthma	Ingest a daily dose of fresh root infusion for a maximum of 15 days.
	<i>Mimosa pudica</i> L.	INSciR-0534	Herb	Thotta-surungi	Tooth ache	Root decoction is gargle to reduce toothache.
	<i>Mucuna pruriens</i> (L.) DC.	INSciR-0261	Climber	Punai-kaali ver	Sexual disorder	Root extract is mixed with milk and consumed orally twice daily after meals for a week to enhance body vitality.
	<i>Senna auriculata</i> (L.) Roxb.	INSciR-0493	Shrub	Aavarampoo	diabetes	Fresh flower petals are taken orally to cure diabetes.
	<i>Senna italica</i> Mill.	INSciR-0494	Herb	Nila-vaagai	Constipation	Take herbal infusion three times daily for two days to relieve constipation.

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
	<i>Trigonella foenum-graecum</i> L.	INSciR-0522	Herb	Venthayam	Diabetes	Water-soaked seeds are taken orally daily before food until cured.
Liliaceae	<i>Allium cepa</i> L.	INSciR-0549	Herb	Ulli / Vengayam	Cold and cough	Raw onion bulbs are eaten as a side dish while taking food.
	<i>Allium sativum</i> L.	INSciR-0532	Herb	Poondu	Gastritis	Raw garlic bulbs are eaten to relieve gas trouble.
	<i>Aloe vera</i> (L.) Burm.f.	INSciR-0521	Herb	Kaththalaai / Katraalai	Skin disease	Cleaned leaf gel is taken orally once a day for 15 days.
	<i>Asparagus racemosus</i> Willd.	INSciR-0447	Climber	Thanner-vittan kilangu	Gastric ulcer	Cleaned fresh tubers are taken orally to cure gastric ulcers until the condition is cured.
	<i>Smilax zeylanica</i> L.	INSciR-0516	Climber	Parangipattai	Rheumatism	Oral administration of powdered root bark is taken with hot water once daily for a maximum of seven days to alleviate rheumatism.
Loganiaceae	<i>Strychnos potatorum</i> L.f.	INSciR-0334	Tree	Thethan-kottai	Water purifier	The seeds are applied to the interior of the water storage container and are subsequently filled with water.
Loranthaceae	<i>Dendrophthoe falcata</i> (L.f.) Ettingsh.	INSciR-0246	Herb	Pulluruvi	Rheumatism	Fresh leaves are made into a paste and applied externally on the afflicted areas.

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
Malvaceae	<i>Abutilon indicum</i> (L.) Sweet	INSciR-0517	Shrub	Thuththi	Piles	Decoction of the fresh leaf is taken orally every morning and evening on an empty stomach until cured.
	<i>Ceiba pentandra</i> (L.) Gaertn.	INSciR-0464	Tree	Ilavamaram	Pimples	Prickles are collected from stems made into a paste and applied externally on pimples.
	<i>Firmiana simplex</i> (L.) W.Wight	INSciR-0541	Tree	Kuthirai-pitukkan	Edible	Roasted seeds are edible
	<i>Thespesia populnea</i> (L.) Sol. ex Corrêa	INSciR-0230	Tree	Poovarasu	Skin disease	Fruit paste is used for skin disease
Meliaceae	<i>Azadirachta indica</i> A.Juss	INSciR-0075.	Tree	Vembu	Stomach pain	Fresh foliage is ingested to facilitate the expulsion of intestinal parasites from the digestive system.
	<i>Melia azedarach</i> L.	INSciR-0546	Tree	Malaivembu	Intestinal worms	2-3 teaspoons of the leaf juice are taken orally for three days to cure intestinal worms
Menispermaceae	<i>Tinospora cardifolia</i> (Willd.) Hook.f. & Thom.	INSciR-0269	Climber	Seenthilkodi	Blood purifier	Fresh stem powder is taken orally daily two times before food for up to 48 days
Muntingiaceae	<i>Muntingia calabura</i> L.	INSciR-0250	Tree	Then Pazham	Edible	Fresh fruits are edible
Oleaceae	<i>Jasminum sambac</i> (L.) Sol.	INSciR-0304	Shrub	Malligai	Prevent lactation	Jasmine flower is placed on the mother's breasts to prevent excessive milk secretion
Onagraceae	<i>Ludwigia octovalvis</i>	INSciR-0542	Herb	Neer Kirambu	Dysentery	Fresh leaf decoction is

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
	(Jacq.) P.H.Raven					taken orally to stop
Papaveraceae	<i>Argemone mexicana</i> L.	INSciR-0546	Herb	Bramma-thandu	Fungal infection on the scalp (Puzhuvettu)	Apply plant sap directly on the affected area for two weeks.
Pedaliaceae	<i>Pedaliium murex</i> L.	INSciR-0398	Herb	Yanai nerunji	Kidney stone	When the plant is soaked in water, the water becomes curd and 1-2 cups of it are taken orally to treat pains due to kidney stones.
Plumbaginaceae	<i>Plumbago zeylanica</i> L.	INSciR-0540	Herb	Kodiveli	Headache	Root bark paste is applied forehead once a day for two days to cure headaches.
Poaceae	<i>Bambusa bambos</i> (L.) Voss	INSciR-0530	Shrub	Moongil	Skin disease	Shoot tip extract is used to treat inflammation conditions. Paste of roots is various skin diseases.
	<i>Cynodon dactylon</i> (L.) Pers.	INSciR-0067	Herb	Aruku	Blood purification	Herbal infusion is consumed orally twice daily for 48 days on an empty stomach.
Portulocaceae	<i>Portulaca oleracea</i> L.	INSciR-0527	Herb	Pasalai	Fodder	Used as Fodder
Rhamnaceae	<i>Ziziphus mauritiana</i> Lam.	INSciR-0512	Shrub	Ilanthai	Edible	Fruits are edible
Rubiaceae	<i>Canthium coromandelicum</i> (Burm.f.) Alston	INSciR-0486	Shrub	Mullu-kaarai	Cuts and wounds	Root paste is applied on affected area up to 2-3 days
Rutaceae	<i>Aegle marmelos</i> (L.) Corrêa	INSciR-0433	Tree	Vilvam	Cold and cough	Infusions of fresh leaves are ingested with 5-6 pepper twice

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
						daily for a week.
	<i>Limonia acidissima</i> L.	INSciR-0523	Tree	Vilampazham	Sexual disorder	The matured fruit pulp is eaten to control sexual
	<i>Murraya koenigii</i> (L.) Spreng.	INSciR-0518	Shrub	Karuveppilai	Hair dye	Fresh leaves are used to make hair dye
Sapindaceae	<i>Cardiospermum corindum</i> L.	INSciR-0049	Climber	Mudaku-aruthan	Body pain	Herbal infusion is consumed orally twice daily for five days.
	<i>Cardiospermum halicacabum</i> L.	INSciR-0059	Climber	Mudaku-aruthan	Joint pain	Herbal infusion is consumed orally twice daily for five days.
	<i>Sapindus emarginatus</i> Vahl.	INSciR-0319	Tree	Soppukkottai	Detergent powder	Seed powder is used as a substitute for soap in washing clothes
Scrophulariaceae	<i>Scoparia dulcis</i> L.	INSciR-0194	Herb	Sarkarai-vembu	Kidney stone	Leaf decoction is taken orally for seven days on an empty stomach to remove the kidney stone.
Solanaceae	<i>Datura metel</i> L.	INSciR-0513	Herb	Oomathai	Skin disease	Leaves with castor oil are applied externally for 3-4 days to cure boils.
	<i>Datura discolor</i> Bernh.	INSciR-0508	Herb	Karuoomathai	Skin disease	Flower paste is applied externally on the affected area until cured
	<i>Solanum nigrum</i> L.	INSciR-0034	Herb	Milakuthakkali	Ulcer	Fresh leaf infusion is ingested on an empty stomach twice daily for three consecutive days.

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
	<i>Solanum pubescens</i> Willd.	INSciR-0053	Shrub	Kaattu sundai	Intestinal worms	Fried mature fruits are taken orally for 2-3 days to remove the worms
	<i>Solanum surattense</i> Burm.f.	INSciR-0499	Herb	Kandankatthari	Cold and cough	Fresh/dry leaves are decoction taken orally 3-4 days to cure
	<i>Solanum trilobatum</i> L.	INSciR-0506	Shrub	Thudhuvalai	Cold and cough	Fresh/dry leaves are decoction taken with black pepper powder orally 3-4 days to cure.
	<i>Withania somnifera</i> (L.) Dunal	INSciR-0550	Herb	Amukara	Immune booster	Root infusion is mixed with milk, consumed twice daily after meals for a week for Immune booster.
Sterculiaceae	<i>Waltheria indica</i> L.	INSciR-0502	Herb	Sembudu	Dysentery	Fresh root decoction is taken orally for two times per day to stop
Talinaceae	<i>Talinum portulacifolium</i> (Forssk.) Aschers. ex Schw.	INSciR-0498	Herb	Paruppu keerai	Edible	Cooked leaves are consumed as food.
Tiliaceae	<i>Grewia hirsuta</i> M.Vahl.	INSciR-0016	Shrub	Kottampalam	Edible	Fruits are edible
Ulmaceae	<i>Celtis philippensis</i> Blanco	INSciR-0270	Tree	Kodalimuruki	Timber value	Woods are used for timber value
Verbenaceae	<i>Clerodendrum phlomidis</i> L.f.	INSciR-0497	Shrub	Thaluthalai	Joint pain	Fresh leaves are made into a paste and applied topically on the afflicted areas.
	<i>Gmelina asiatica</i> Roxb.	INSciR-0226	Shrub	Nila-kumizh	Headache	Leaf paste is applied to relieve headache

Family	Botanical Name	Voucher number	Habit	Vernacular (Tamil) name	Conditions	Remedies
	<i>Phyla nodiflora</i> (L.) Greene	INSciR-0495	Herb	Poduthalai	Dandruff	Leaf paste is applied to hair 30 minutes before taking a bath.
	<i>Vitex negundo</i> L.	INSciR-0483	Shrub	Notchi	Cold	Fresh leaf infusion of notchi and thumbai is used for steam inhalation twice daily to alleviate cold symptoms
Violaceae	<i>Hybanthus linearifolius</i> (Vahl) Urb.	INSciR-0496	Herb	Orithalthamarai	Infertility	Fresh flowers and fruits are taken orally to cure infertility in men.
Vitaceae	<i>Cissus quadrangularis</i> L.	INSciR-0238	Climber	Pirandai	Joint pain	Shoot paste is applied over the joints for a week to get relief.
	<i>Cissus setosa</i> Roxb.	INSciR-0494	Climber	Pulinaralai	Clean vessel	The leaves are used to clean copper vessels
Zygophyllaceae	<i>Tribulus subramanii</i> P. Singh, Giri & V. Singh	INSciR-0446	Herb	Siru-neringil	Kidney problems	The crushed fruit is consumed twice daily for a fortnight.
	<i>Tribulus terrestris</i> var. <i>bicornutus</i> (Fisch. & C. A. Mey.) Hadidi	INSciR-0322	Herb	Siru-neringil	Kidney problems	

Plant Parts Used, Mode of Preparation and Route of Administration

Among the medicinal plant parts used, leaves were the most frequently employed by the community, as evidenced by 54 use reports followed by root, fruit and stems (Fig 2A). Likewise, leaves are widely utilized by tribal and other communities globally in the preparation of herbal remedies for treating various ailments (Ayyanar & Ignacimuthu 2011; Giday *et al.*, 2010; Jagtap *et al.*, 2006). This preference for leaves is attributed to their year-round availability and ease of collection from forests.

The indigenous people prepare and use different forms of herbal medicines for treating various conditions. These include raw plant components, paste, decoction, juice extracted from fresh plant parts, coarsely powdered dried materials and latex (Fig 2B). The

preparations are administered orally (59%), as an external application (40%), or by inhalation (1%).

Plants Used for Various Ailments

The indigenous healers and rural communities in the study area use botanical remedies to treat a variety of ailments. These include asthma, hypertension, blood purification, body pain, fatigue, boils, colds, coughs and colds, cuts and wounds, dandruff, diabetes, diarrhea, dysentery, eye disorders, fever, fungal infections, gastric ulcers, hair loss, headaches, heart disorders, indigestion, infertility, intestinal worms, joint pain, kidney problems, kidney stones, obesity, piles, pimples, poisonous bites, rheumatism, sexual disorders, skin diseases, stomach pain, swellings, throat infections, toothaches, ulcers, viral fevers, and warts (Table 3). Among the local population studied, skin diseases were frequently diagnosed and treated with nine species of ethnomedicinal plants.

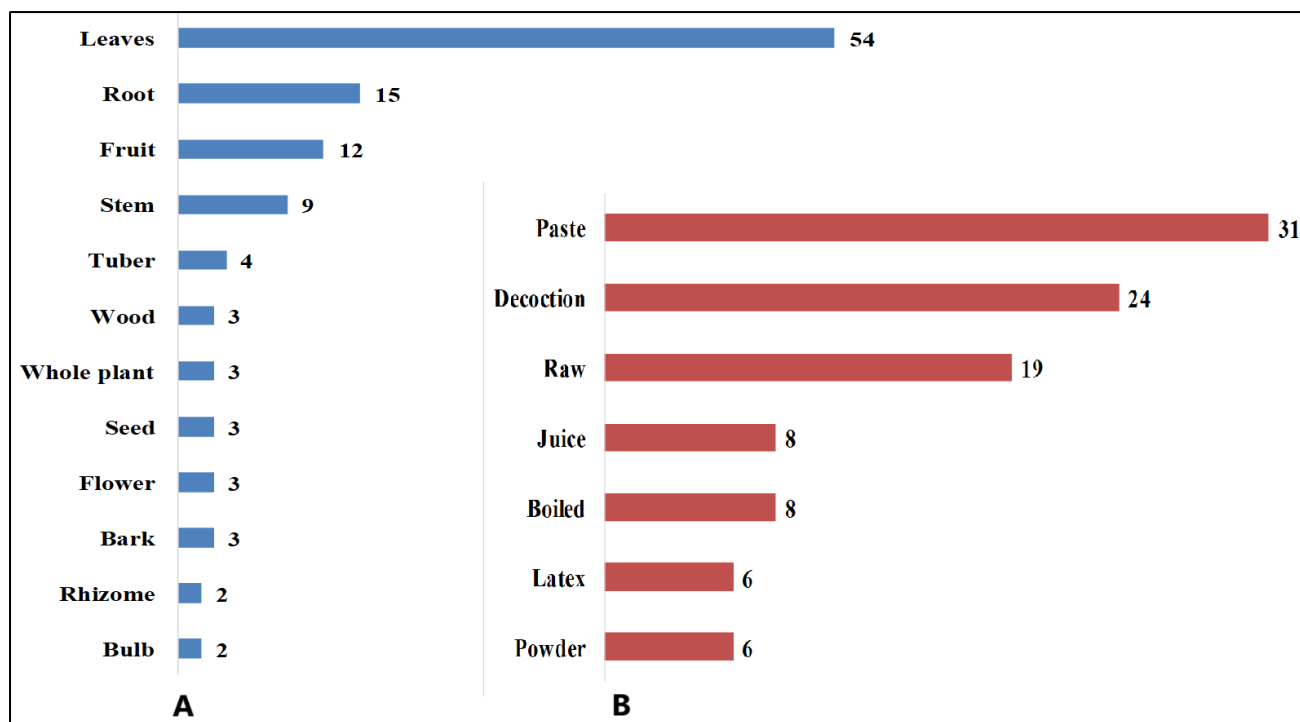


Fig. 2: Plant parts utilized by the local communities in herbal medicines (A) and their modes of preparations (B)

Table 3: Diseases and number of treatments documented in the study area

S. No	Name of the Diseases	No. of remedies documented	S. No.	Name of the Diseases	No. of remedies documented
1.	Asthma	1	22.	Infertility	1
2.	Blood pressure	1	23.	Intestinal worms	2
3.	Blood purifier	3	24.	Joint pain	3
4.	Body pain	1	25.	Kidney problems	2
5.	Body weakness	1	26.	kidney stone	3
6.	Boils	1	27.	Obesity	1
7.	Cold	1	28.	Patchy hair loss	1
8.	Cough & cold	6	29.	Piles	4
9.	Cuts & wounds	7	30.	Pimples	2
10.	Dandruff	2	31.	Poisonous bites	3
11.	Diabetes	3	32.	Rheumatism	3
12.	Dysentery	4	33.	Sexual disorder	2
13.	Eye disorder	2	34.	Skin disease	9
14.	Exorcism	1	35.	Stomach pain	1
15.	Feet irritation	1	36.	Throat infection	1
16.	Fever	4	37.	Toothache	4
17.	Gastric ulcer	2	38.	Ulcer	3
18.	Hair fall	1	39.	Viral fever	1
19.	Headache	2	40.	Wart	2
20.	Immune booster	1	41.	Wounds and swellings	1
21.	Indigestion	1			

On the recorded medicinal plants, 52 plants were reported by non indigenous people, 29 by traditional healer, and 32 by the indigenous people. Additionally, nine plants (*Abutilon indicum*, *Acalypha indica*, *Argemone mexicana*, *Aristolochia indica*, *Cardiospermum halicacabum*, *Clerodendrum phlomidis*, *Evolvulus alsinoides*, *Syzygium cumini*, *Tribulus*

terrestris var. *bicornutus*) were reported by non indigenous people indigenous people as well as traditional healer. Most of the plants cited in this study were sourced from natural habitats (87%) and some from home gardens (13%). Similarly, Kani traditional healers in the Tirunelveli hills of southern Tamil Nadu predominantly use six plant species (*Acalypha indica*,

Anacardium occidentale, *Cleome viscosa*, *Euphorbia hirta*, *Opuntia dillenii* and *Milletia pinnata*) for treating wounds and injuries. It is important to note that these plants demonstrated significant wound-healing activities in experimental animals (Ayyanar & Ignacimuthu, 2009).

Plants used for Purposes other than Medicinal Uses

The indigenous people in the current research area are utilizing 16 plants for various non-medicinal purposes. Seven species are consumed as vegetables (e.g., *Portulaca oleracea* and *Talinum portulacifolium*), with many of these commonly used vegetables contributing to the nutritional security of the local community. Sundriyal and Sundriyal (2004) have documented studies on wild edible plants and vegetables in the Sikkim Himalaya, which possess high nutritional value. Four plant species produce fruits (*Carissa carandas*, *Grewia hirsuta*, *Muntingia calabura*, *Syzygium cumini*, and *Ziziphus mauritiana*) that are consumed as food, along with seeds of *Sterculia urens*. The local communities in the study area hold a strong belief in the supernatural powers of plants. For example, *Bambusa bambos* (Moongil) is associated with festivals, and the temple is named “Shri Moongilanai Kaamaatchi Amman” in its honor. Additionally, fruit plants such as *Carica papaya*, *Syzygium cumini*, and *Solanum nigrum* are recognized for their medicinal importance as well as their nutritional value.

CONCLUSION

This paper presents ethnobotanical data on the medicinal plants utilized by the Paliyar tribes and other local communities living in the foothills of Kodaikanal in Theni district, Tamil Nadu, India. A total of 113 plant species belonging to 100 genera and 46 families were recorded to be used for the treatment of various ailments and for other purposes. Fabaceae, Apocynaceae, Amaranthaceae and Solanaceae were the most represented families. A majority of these plants were herbs, followed by shrubs, climbers and trees. According to the informants, many of the traditionally used plants, including *Acorus calamus*, *Aegle marmelos*, *Albizia lebeck*, *Ceiba pentandra*, *Euphorbia tirucalli*, *Phyla nodiflora*, *Tabernaemontana divaricata*, *Thespesia populnea* and *Wedelia chinensis*, have become rare with rapidly declining populations in the area due to over-exploitation.

It is noteworthy that more than 50% of the population in these villages still relies on traditional remedies for common ailments. The currently practicing traditional healer is elderly, but it's interesting to note that the younger generations in these villages are showing interest in pursuing this profession, especially after the recent COVID-19 pandemic, even though it may only yield minimal profit. Therefore, the traditional medicinal knowledge and information provided in this

study hold significant value for scientific validation, product development, conservation efforts, and policy planners aiming for the sustainable management of medicinal plants.

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