



Medicinally Important Tree Species from Choolannur Pea Fowl Sanctuary, Kerala, India

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/EJMP/2020/v31i830258

Editor(s):

- (1) Dr. Francesca Aiello, University of Calabria, Italy.
(2) Prof. Marcello Iriti, University of Milan, Italy.

Reviewers:

- (1) Hafiz Muhammad Asif, Islamia University of Bahawalpur, Pakistan.
(2) Fábio Tonissi Moroni, Universidade Federal do Amazonas, Brazil.
(3) Amooru Gangaiah Damu, Yogi Vemana University, India.
Complete Peer review History: <http://www.sdiarticle4.com/review-history/56595>

Received 25 February 2020

Accepted 02 May 2020

Published 13 May 2020

Original Research Article

ABSTRACT

As trees are the dominant biotic component of any forest ecosystem it plays an important role in the plant kingdom and greatest contributors of food, shelter, fuel, medicine along with friendly environment for sustaining life on earth. The aim of the present study is to explore the medicinal tree wealth in Choolannur Pea Fowl Sanctuary, Kerala, India. Frequent field trips were made for the exploration and identification of tree species present in the deciduous forest of the sanctuary. It was observed that the nearby villagers of the study area have been used 45 plants belonging to 22 families as a remedy for various illnesses. The plant species used against different human ailments have been enumerated in the present paper and each species has been provided with botanical name followed by voucher number, family name, local name, plant part used and medicinal properties.

Keywords: *Exploration and identification; forest ecosystem; medicinal tree wealth; Kerala; deciduous forest; plant species; human ailments.*

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1. INTRODUCTION

Medicinal plants are living and irreparable resources that is exhaustible if over used and sustainable if used with care and wisdom. The importance of medicinal plants is being mentioned since ancient time. Human beings were dependent on medicinal plants for their health problems since thousands of years. Medicinal plants used as remedies for human diseases contain chemical components of therapeutic value that produce physiological action on the human body [1]. Even after the induction of 200 years of modern system of medicine, about 90% people in rural India take the help of local health practitioners for the treatment of various diseases [2]. However, at present medicinal plants are looked upon not only as a source of health care but also as a source of income [3]. These plants generated commercial demand for pharmacopoeial drugs and their products in India [4]. The knowledge of medicinal plants has been accumulated in the course of many centuries based on different medicinal systems such as Ayurveda, Unani and Siddha. In India, it is reported that traditional healers use 2,500 plant species and 100 plant species serve as regular sources of medicine [5]. Since herbal drugs obtained are safer in the treatment of various diseases [6,7], during the

last few decades there is an increasing interest in the study of medicinal plants and their traditional use in different parts of the world [8].

Out of the 1200 species of plants used in this sector, 75% are collected from the forests. The Ayurvedic and Siddha pharmaceutical companies located in Kerala could meet 50% of the raw drags from the forest of Kerala. Among these medicinal plants, trees species are quite different and vulnerable. In India, many tree species have potential for multiple uses. The livelihood, economy and the sociocultural life of the tribal people are directly linked with forest trees. Apart from the therapeutic uses, trees provide various products like, wood, fodder, shelter, fibre, resin, oils and numerous other products used for subsistence and industrial purposes. Hence the medicinal value of these tree species is being veiled by other significant economic qualities. Therefore, many valuable species are becoming endangered due to overexploitation from wild [9] not only for getting medicines and for various other purposes. As a consequence, the study about status of wild tree species is crucial. This study was carried out to investigate the status of wild tree species of medicinal value in the forest of Choolannur Pea Fowl Sanctuary, Kerala, India along with their traditional uses.

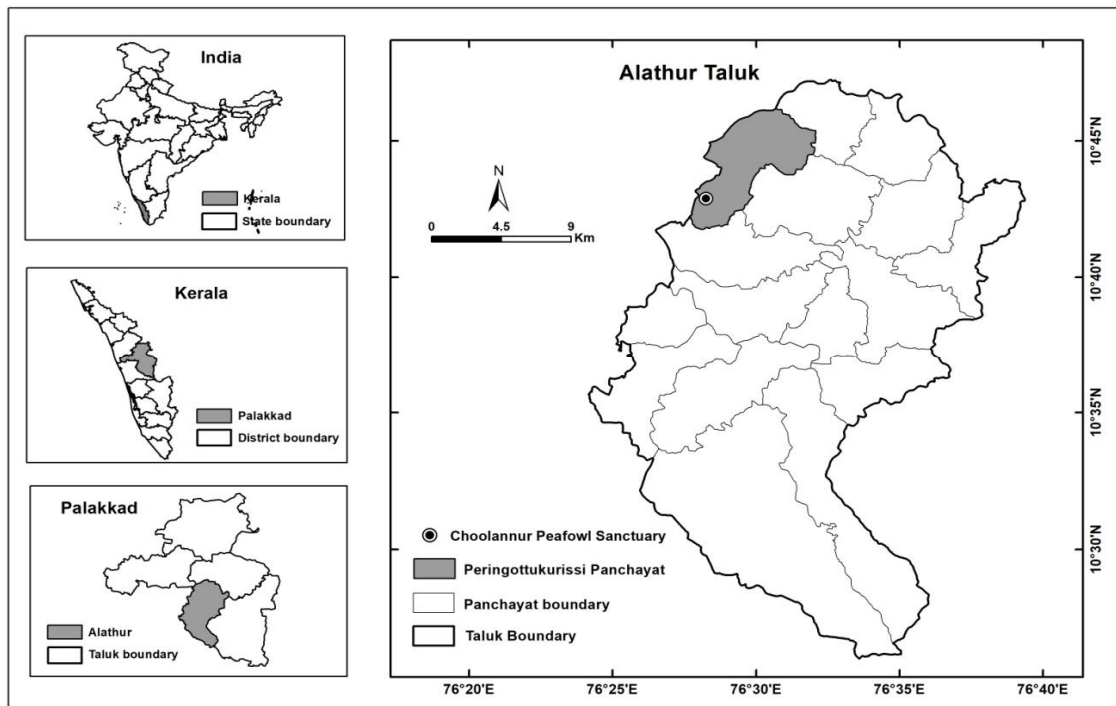


Fig. 1. Geographic location of the study area

Choolannur Pea Fowl Sanctuary or Mayiladumpara, as it is locally known, is a premier haven for peacocks in Kerala. The Choolannur Peafowl Sanctuary (10.70°–10.73°N, 76.45°– 76.48°E; henceforth, CPS) is located near Thiruvillamala village, and comprises 3.42 km² of forests spread over the districts of Thrissur, and Palakkad (Fig. 1). Choolannur Peafowl Sanctuary is dedicated to the memory of a leading Indian ornithologist, K.K. Neelakantan and is situated under Peechi wildlife division of Kerala State Forest and Wildlife Department. This forest area is a type of blending of moist and dry deciduous forests. Most of the species are typical moist deciduous other than the report of some thorny dry deciduous species like *Ziziphus mauritiana* Lam. The terrain is undulating with small hillocks and valleys, with occasional rocky outcrops and patches. The average altitude is about 120 m. The area receives both southwest and northeast monsoons. The average annual precipitation is 2200 mm.

2. MATERIALS AND METHODS

Several field explorations were conducted in the deciduous forests of Choolannur Pea Fowl sanctuary. *Ethnobotany- A Method Manual* was followed as a general source of guidelines for the present study. Several literature pertaining to the districts, people, vegetation, forest types and flora were surveyed to gain a preliminary knowledge about the respective aspects. Interviews were conducted with traditional healers and local people of Choolannur regarding medicinal plant names and their uses during field visits. Information was learned from healers using semi-structured interviews with a questionnaire. Review of literature was carried out to interpret and analyse the data collected during the study. The information recorded in the field was compared with important works pertaining to Indian medicinal plants and ethnobotany such as, Uttarakhand Medicinal Plants Database [10], FRLHT Indian medicinal plants database [11] and Biodiversity documentation for Kerala, Part C: Flowering plants [12]. The voucher specimens collected are deposited in the Sir Syed College, Thaliparamba herbarium. The plants are enumerated alphabetically with their botanical name, voucher number, family, vernacular name, parts used and medicinal property.

3. RESULTS AND DISCUSSION

Since time immemorial, plants have been an indispensable source of medicines for humans

[13] and constitute a major economic resource of most countries of the world. In the study area, the use of traditional medicine is widely accepted. This is evident from the number of plant species identified as medicinal. The use of trees instead of shrubs recorded high number of plants being used for traditional medicine and it could be as a result of their availability throughout the year. The parts of plants commonly used are the leaves and bark. This is due to the availability of these plant parts during the rainy and dry seasons [14,15]. It was observed that most of the plant species have multiple uses and was used in treating and curing different ailments which included wound healing, Skin diseases, fever, asthma, anti cancerous and ulcer among others [14] eg: *Azadirachta indica* A. Juss., *Stereospermum colais* (Buch.-Ham. ex Dillw.) Mabb. and *Cassia fistula* L. The medicinal use of plants leaves and roots in the management and treatment of diseases has been an age long practice [16].

The data obtained from the survey is compiled in table, where the plant species are arranged in alphabetical order. A total of 45 species belonging to 41 genera and 22 families have been reported for the treatment of human diseases. For each species scientific name, voucher number, family, local name, parts used, and medicinal property are provided. Among the 22 families recorded, the dominant families were Fabaceae and Moraceae with five species (11%), Apocynaceae, Combretaceae, Anacardiaceae and Rutaceae with 3 species each (7%). 2 species (4%) from Euphorbiaceae, Oleaceae, Burseraceae, Verbenaceae, Bignoniaceae, Sapindaceae and Loganiaceae are found to be medicinal species (Fig. 2). Of the 22 families, 9 represent single species each (2%). Bark was the most used (32%) part, followed by leaves (27%), fruits (17%), root (14%), seeds (6%), stem (3%), and whole plant (2%) in decreasing order (Fig. 3). The herbal preparations were in the form of juice, decoction, powder and paste. Even though, all the recorded medicinal plants are available in the study area, the occurrence of *Strychnos potatorum* L.f., *Commiphora caudata* (Wight & Arn.) Engl. and *Lannea coromandelica* (Houtt.) Merr. are scarce.

Most of the species collected from the study area was traditionally used for gastrointestinal disorders. Around 17 species (37.8%) was in this category. Common among them are, *Alstonia scholaris* (L.) R. Br., *Cassia fistula* L., *Diospyros melanoxylon* Roxb., *Ficus racemosa* L., *Garuga*

pinnata Roxb., *Gmelina arborea* Roxb. and *Hydnocarpus pentandra* (Buch.-Ham.). The therapeutic properties and the number of plants showing such properties in the decreasing order of the number of plants go as, 14 plants (31.1%) anti-inflammatory, 11 plants (24.4%) respiratory, 10 plants (22.2%) antidiarrheal, 8 plants (17.7%) antidiabetic, 6 plants (13.3%) antioxidant and antirheumatic each, 5 plants (11.11%) antimicrobial and anthelmintic each (Fig. 4). Medicinally important plants used to treat various types of skin diseases like eczema, dermatitis and psoriasis are *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr., *Careya arborea* Roxb., *Oroxylum indicum* (L.) Benth., *Pongamia pinnata* (L.) Pierre., *Sapindus trifoliatus* L. and *Strychnos potatorum* L.f. One of the important plants *Premna tomentosa* Willd. widely used against dog bites by the surrounding villagers was a notable species. 4 species like *Alstonia scholaris* (L.) R. Br., *Artocarpus gomezianus* Wall. ex Trecul ssp. *zeylanicus* Jarrett., *Stereospermum colais* (Buch.-Ham. ex Dillw.) Mabb. and *Terminalia cuneata* Roth. having anticancerous properties is also available in the deciduous forest of Choolannur.

During the study it was observed that species like *Phyllanthus emblica* L., *Tabernaemontana alternifolia* L. and *Wrightia tinctoria* (Roxb.) R. Br., which were once plentiful in Choolannur sanctuary area are now becoming rare. This is due to lack of adequate knowledge regarding judicious exploitation of these plants. The reported species are wild except *Santalum album* L. which was planted by the Department of Forest in connection with social forestry. The most significant plants from the study site

prescribed by the majority of the traditional medicinal practitioners were *Terminalia cuneata* Roth., *Pongamia pinnata* (L.) Pierre., *Ficus racemosa* L., *Wrightia tinctoria* (Roxb.) R. Br., *Tabernaemontana alternifolia* L. and *Azadirachta indica* A. Juss. Among the 45 plants species having therapeutic potential, the most commonly used species for treatment of snakebite was *Anogeissus latifolia* (Roxb. ex DC.) Wall. ex Guill. & Perr. with highest use value among practitioners followed by *Chionanthus malabenghi* (Dennst.) and *Streblus asper* Lour. The findings of this study suggest that some medicinal plants are promising sources of several chemical constituents.

In this connection, mass awareness among the local populace should be generated regarding conservation of the medicinal plants. The unprecedented interest and demand for plants with medicinal properties and potency for treatment of various ailments is causing over exploitation of such plant genetic resources in the study area. Many of these plants in the study area are threatened now due to constraints of population and natural hazards. Therefore, documentation of traditional knowledge is the only way out to preserve the plants of this area. The present finding is the first record of medico botanical knowledge in the study area. The information given in the present study will be helpful for the pharmacognosist, botanist and pharmacologist for the collection and identification of the plant for their research work. The survey may create awareness on the importance and conservation of medicinal plants among young budding botanists.

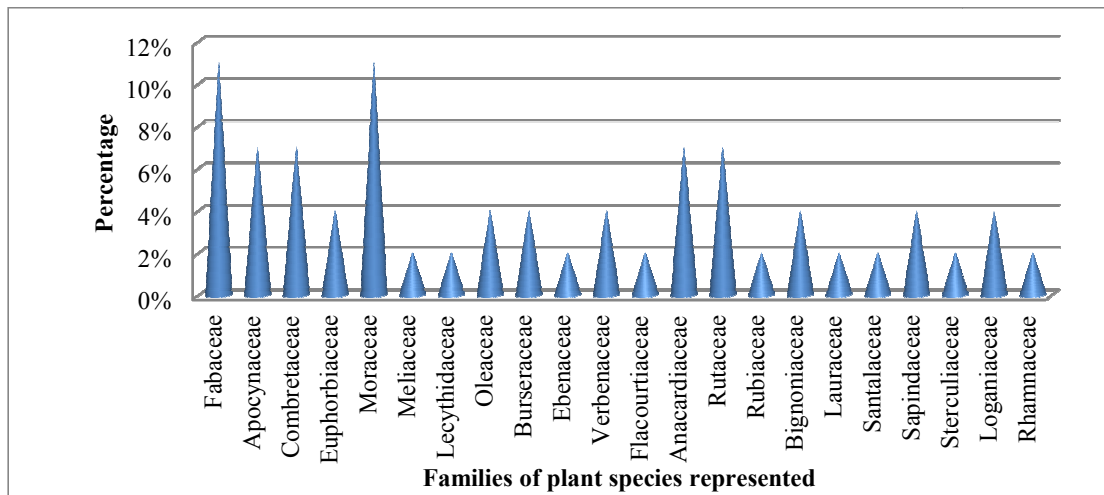


Fig. 2. Percentage distribution of families from the study area

Table 1. Taxonomical and medicinal details of tree species recorded from the study area

No	Botanical Name	Voucher No:	Family	Vernacular name	Parts Used	Therapeutic properties
1	<i>Acacia catechu</i> (L.f.) Willd.	SSC4	Fabaceae	Karingali, Kadiram, Cutch tree	Bark	Astringent, cooling and digestive, beneficial in cough and diarrhea [17]
2	<i>Albizia amara</i> (Roxb.) Boivin.	SSC12	Fabaceae	Chalavagai, Nenmenivaka	Leaves	Antioxidant [18]
3	<i>Alstonia scholaris</i> (L.) R. Br.	SSC14	Apocynaceae	Daivappala, Ezhilamppala	Bark, leaves	Malaria, jaundice, gastrointestinal troubles, cancer, etc. [19]
4	<i>Anogeissus latifolia</i> (Roxb. ex DC.) Wall. ex Guill. & Perr.	SSC16	Combretaceae	Kalkanjiram, Korattykanjiram	Bark	Diarrhea, dysuria, cough, colic, liver complaints, snake bite and skin diseases [10]
5	<i>Antidesma ghaesembilla</i> Gaertn.	SSC21	Euphorbiaceae	Kattupulinch, Poothuruval	Leaves	Blood nourishment and headache [20]
6	<i>Artocarpus gomezianus</i> Wall. ex Trecul ssp. <i>zeylanicus</i> Jarrett.	SSC23	Moraceae	Chima, Kattukadaplavu	Fruit	Anti-inflammatory, antiviral, anticancer and anti-HIV properties [21]
7	<i>Azadirachta indica</i> A.Juss.	SSC25	Meliaceae	Ariyaveppu, Ayurveppu	Root, Stem, Leaves, Fruits	Anti-fungal, anti-aging, antibacterial, Anti-diabetic, antihypertensive, anti-inflammatory, antioxidant and antispasmodic [22]
8	<i>Careya arborea</i> Roxb.	SSC28	Lecythidaceae	Peru, Pezhu	Bark	Tumours, bronchitis, epileptic fits and skin diseases [23]
9	<i>Chionanthus mala-elengi</i> (Dennst.)	SSC34	Oleaceae	Kallidala, Mala-elengi	Whole plant	Used against snakebite[24]
10	<i>Cassia fistula</i> L.	SSC48	Fabaceae	Kanikonna, Konna	Root, Bark, Seeds, Leaves	Laxative, cathartic, emetic, astringent, tonic, febrifuge, purgative, asthma, skin diseases, leprosy, tuberculosis and syphilis [25]
11	<i>Commiphora caudata</i> (Wight & Arn.) Engl.	SSC49	Burseraceae	Idinjil, Kilimaram	Leaves	Anti-inflammatory [26]
12	<i>Diospyros melanoxylon</i> Roxb.	SSC59	Ebenaceae	Beediyilamaram Kari	Fruit	Relieving flatulence and to check excessive bile secretion [27]

No	Botanical Name	Voucher No:	Family	Vernacular name	Parts Used	Therapeutic properties
13	<i>Ficus benghalensis</i> L.	SSC64	Moraceae	Alamaram Peraal	Bark, Leaves	Diabetes, impotency, leucorrhoea [28]
14	<i>Ficus callosa</i> Willd.	SSC67	Moraceae	Kadaplavu		Antioxidant, radical scavenging activities [29]
15	<i>Ficus racemosa</i> L.	SSC71	Moraceae	Atthi, Atthi-al	Bark	Skin and vaginal diseases and ulcers [30]
16	<i>Garuga pinnata</i> Roxb.	SSC72	Burseraceae	Annakkara Eechakkara	Leaves, Bark	Stomachic and expectorant and to cure diarrhea, opacities of the conjunctiva [31]
17	<i>Gmelina arborea</i> Roxb.	SSC80	Verbenaceae	Kumizhanpazham Kumizhu	Bark, Root	Hallucination, fever, dyspepsia, hyperdipsia, haemorrhoids, stomachalgia, heart diseases, nervous disorders, piles and burning sensation [32]
18	<i>Hydnocarpus pentandra</i> (Buch.-Ham.) Oken.	SSC82	Flacourtiaceae	Kotti Maravetti Marotti	Seeds	Leprosy, skin diseases, eczema, dermatitis, tubercular laryngitis, chronic ulcers, dyspepsia, flatulence and verminosis[30]
19	<i>Lannea coromandelica</i> (Houtt.) Merr.	SSC83	Anacardiaceae	Karasu, Uthi	Brk, Leaves	Astringent, impetigenous eruptions, leprous ulcers and obstinate ulcers, swelling and body pains[25]
20	<i>Melicope lunu-ankenda</i> (Gaertn.) Hartley.	SSC85	Rutaceae	Kambili Kanala	Leaves	Hypertension, diabetes mellitus, fever, menstrual disorders, and as a tonic[33]
21	<i>Morinda pubescens</i> J. E.	SSC91	Rubiaceae	Manjanathi Manjapavitta	Fruit	Antimicrobial, antifungal, wound healing, antidiabetic and hepatoprotective activities [34]
22	<i>Naringi crenulata</i> (Roxb.)	SSC94	Rutaceae	Manmatham Narinarakam	Root, Fruit, Leaves	Purgative, sudorific, intestinal fermentation, small-pox, malignant and persistent fevers and epilepsy [25]
23	<i>Olea dioica</i> Roxb.	SSC101	Oleaceae	Edana Edala	Bark, Leaves	Febrifuge and emetic [30]

No	Botanical Name	Voucher No:	Family	Vernacular name	Parts Used	Therapeutic properties
24	<i>Oroxylum indicum</i> (L.) Benth.	SSC102	Bignoniaceae	Palakapayyani Payyazhantha	Roots	Astringent, antiinflammatory, antihelminthic, antibronchitic, antileucodermatic, antirheumatic, antianorexic and for treatment of leprosy [35]
25	<i>Persea macrantha</i> (Nees) Kosterm.	SSC104	Lauraceae	Kulamavu Kulirmavu	Bark	Asthma, rheumatism and ulcers [36,37]
26	<i>Phyllanthus emblica</i> L.	SSC107	Euphorbiaceae	Amalakam Nelli	Fruit	Memory enhancing, ophthalmic disorders, lowering cholesterol level, antioxidant, immunomodulatory, antipyretic and analgesic[38]
27	<i>Pongamia pinnata</i> (L.) Pierre.	SSC109	Fabaceae	Ungu, Pongu	Bark, Root	Ulcers, rheumatism, leucoderma and scabies[39]
28	<i>Premna tomentosa</i> Willd.	SSC111	Verbenaceae	Kozhukkattathekku Naithekkku	Leaves	Diarrhoea, hepatic disorders, stomach disorders, dog bites, anaemia, rheumatism, diuretic and anti-inflammatory [40]
29	<i>Pterocarpus marsupium</i> Roxb.	SSC115	Fabaceae	Karavenga, Venga	Bark, Wood	Anti diabetic, depurative, hemostatic, and rejuvenating, antiinflammatory, headache, antipyretic, anti- helminthic, aphrodisiac, alexeteic, mental aberrations and ulcers [41]
30	<i>Santalum album</i> L.	SSC117	Santalaceae	Chandanam	Stem	Diarrhoea with bleeding, intrinsic haemorrhage, bleeding piles, vomiting, poisoning, hiccoughs, initial phase of pox, urticaria, eye infections and inflammation of umbilicus [42]
31	<i>Sapindus trifoliatus</i> L.	SSC118	Sapindaceae	Urunjikai, Soapinkaimaram	Fruits	Skin problems like Eczema and Psoriasis, asthma, cough, expectorant, anti inflammatory,

No	Botanical Name	Voucher No:	Family	Vernacular name	Parts Used	Therapeutic properties
						ingredient in Ayurvedic shampoos and cleansers [43]
32	<i>Schleichera oleosa</i> (Lour.) Oken.	SSC120	Sapindaceae	Poovanam Poovam	Bark, Fruits	Astringent, anthelmintic and to treat menorrhoea, malaria and dysentery[44,45]
33	<i>Semecarpus anacardium</i> L. f.	SSC121	Anacardiaceae	Cheru Cherumaram	Fruit	Antiinflammatory activity comparable to the reference standard aspirin[46]
34	<i>Spondias pinnata</i> (L. f.) Kurz.	SSC123	Anacardiaceae	Ambazham Kattambazham	Bark	Potent anthelmintic properties [47]
35	<i>Sterculia guttata</i> Roxb. ex DC.	SSC125	Sterculiaceae	Aanathondimaram Kavalam	Leaves	Antiepileptic, Fever and diarrhea [48]
36	<i>Stereospermum colais</i> (Buch.-Ham. ex Dillw.) Mabb.	SSC127	Bignoniaceae	Pathiri Poopathiri	Bark, Root	Anodyne, antidiabetic, appetiser, constipating, diuretic, lithotropic, expectorant, cardio tonic, aphrodisiac, antiinflammatory, anti bacterial, anti-cancer [49]
37	<i>Streblus asper</i> Lour.	SSC130	Moraceae	Dindumaram Paravamaram	Root, Bark	Snake-bite, obesity, diarrhoea, dysentery, piles and epilepsy [50]
38	<i>Strychnos nux-vomica</i> L.	SSC131	Loganiaceae	Kanjiram Kanniram	Seeds	chronic dysentery, cholera, diabetes, emotional disorders, hysteria, epilepsy, intermittent fevers, gout, rheumatism, hydrophobia and insomnia [51]
39	<i>Strychnos potatorum</i> L.f.	SSC134	Loganiaceae	Thettamaram Thettamparel	Fruits, Root,	Emetic, diaphoretic, astringent, leukeoderma, eye diseases, thirst, snake poisoning, hallucinations, aphrodisiac, tonic, diuretic and good for liver, kidney complaints[52]
40	<i>Tabernaemontana alternifolia</i> L.	SSC136	Apocynaceae	Kuruttupala Koonampala	Leaves, Bark	Venereal diseases, gonorrhoea, respiratory problems, nervous disorders, diabetes, chronic bronchitis, rheumatism, cardiotonic

No	Botanical Name	Voucher No:	Family	Vernacular name	Parts Used	Therapeutic properties
41	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	SSC138	Combretaceae	Thanni Thannikka	Fruit	ailments, antioxidant and antiproliferative, and snake bite [53] Indigestion, acidity and to improve functions of stomach and intestine [28]
42	<i>Terminalia cuneata</i> Roth.	SSC139	Combretaceae	Kulamaruthu Neermaruthu	Bark, Leaves	Hepatic, antibacterial, anthelmintic, antimicrobial, antitumoral, antioxidant, antiallergic, antifeedant, antifertility, anti-HIV activities, blood diseases, anemia, venereal and viral disease, fractures, ulcers[54]
43	<i>Wrightia tinctoria</i> (Roxb.) R. Br.	SSC140	Apocynaceae	Dhanthappala, Kotakappala	Bark, Seeds	Dysentery, astringent, febrifuge, Bark tonic and aphrodisiac [25]
44	<i>Zanthoxylum rhetsa</i> (Roxb.) DC.	SSC141	Rutaceae	Kothumurikku Mullilam	Bark	Antidiabetic, antispasmodic, diuretic and anti-inflammatory activities [55]
45	<i>Ziziphus mauritiana</i> Lam.	SSC142	Rhamnaceae	Elentha, Jujuba, Ilantha	Leaves	Dressing materials to treat wounds [56]

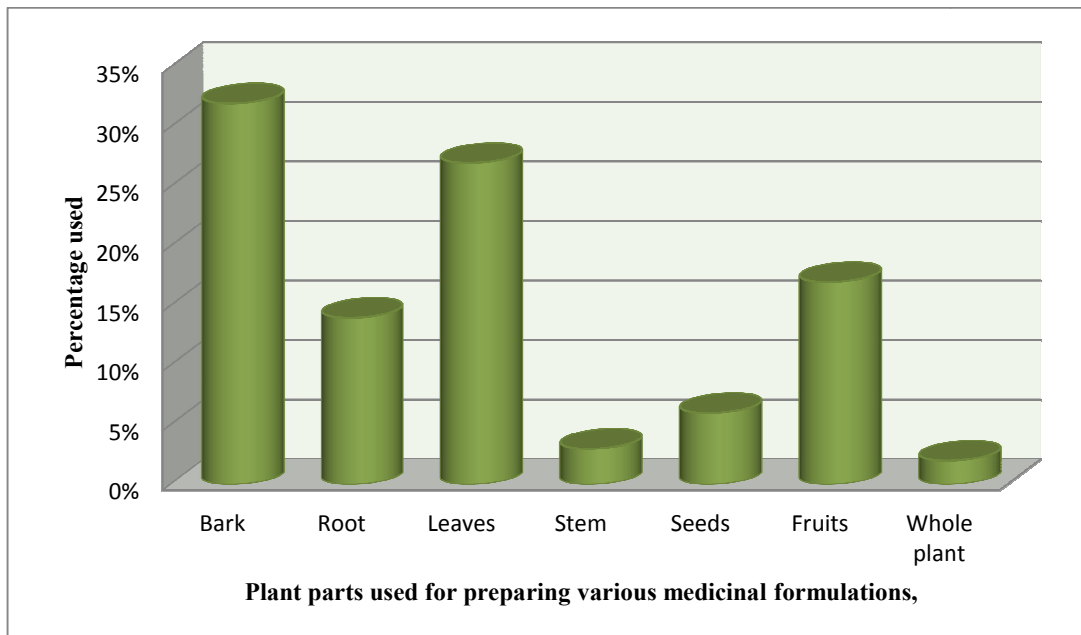


Fig. 3. Percentage distribution of plant part used

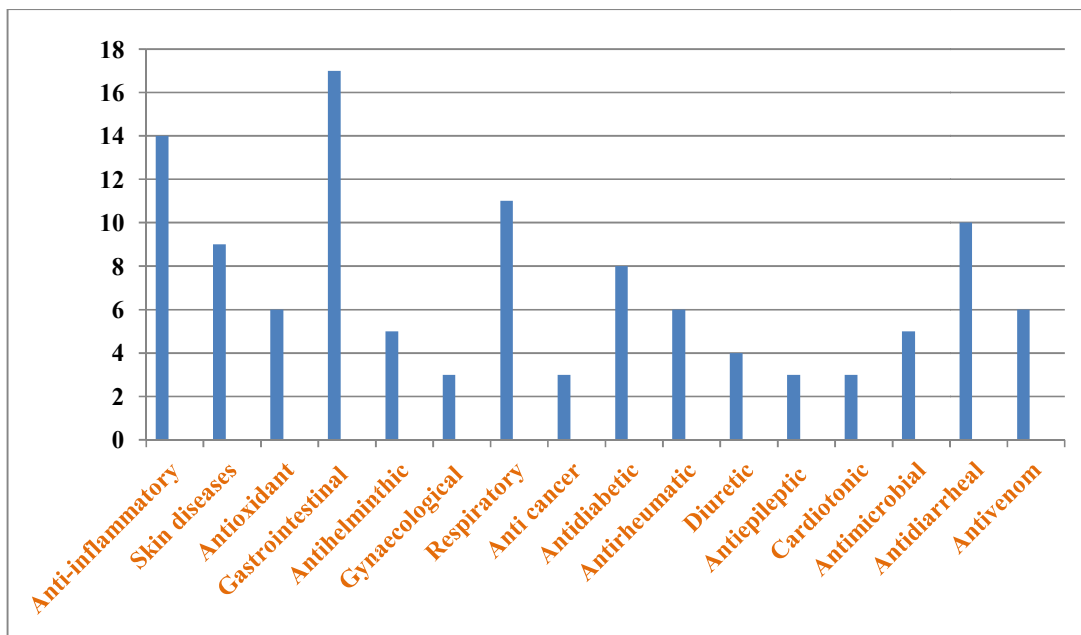


Fig. 4. Graphical representation of medicinal properties of different species

4. CONCLUSION

The present study reveals the therapeutic potential of 45 plant species belonging to 22 families, in which family Fabaceae and genus *Ficus* appeared highly useful plant groups by local people in the study area.

Highest number of medicinally useful plants from family Fabaceae has also been reported in other studies [57,58] and the importance of genus *Ficus* has also been mentioned by other authors [59]. The study witness tropical climate wherein barks of the trees are enormously used (32%) for their therapeutic

properties [60]. These medicinal plant species unfortunately due to their over exploitation there is a great danger of their extinction. Hence, effort must be taken to protect these species in this area by involving the local communities in preservation and conservation aspects.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENT

We thankful to all the traditional healers and rural people of Choolannur in Palakkad district of Kerala state for sharing their valuable information on traditional knowledge of medicinal plants. We also thankful to Peechi wildlife division of Kerala State Forest and Wildlife Department for giving a permission to enter the sanctuary for plant exploration.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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