

DIVERSITY AND CONSERVATION STATUS OF FLORA IN PILAVAKKAL DAM FOOTHILLS OF WESTERN GHATS, TAMIL NADU, INDIA

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DIVERSITY AND CONSERVATION STATUS OF FLORA IN PILAVAKKAL DAM FOOTHILLS OF WESTERN GHATS, TAMIL NADU, INDIA. The floristic study is necessary to understand the present diversity status and conservation of forest biodiversity. It has been realized that the study of local or regional flora is of much more significance than those covering big areas because explorations can be carried out intensively in small areas with damaging consequences. Understanding species diversity and distribution patterns are important to evaluate the complexity and resources of these forests. In the present study, the medicinal floristic diversity of Pilavakkal dam Foothills of the Western Ghats comprised of 127 species belonging to 42 families and 100 genera. Fabaceae, Malvaceae and Lamiaceae were dominant families with 23, 11 and 10 species, respectively. The total number of species includes 55 herbs, 23 shrubs, 37 trees and 12 climbers. Totally 127 important medicinal plant species are recorded in Pilavakkal dam Foot Slopes of Western Ghats. *Psydrax dicoccos* is vulnerable in this list, 27 plants species are Least Concern and *Mangifera indica* comes under the Data Deficient and 98 plants species evaluated are not categorized by IUCN. This study provides basic information about the medicinal flora and conservation status of the Pilavakkal dam Foothills of Western Ghats. It would also be helpful for the identification of flora and to derive conservation policies and make sustainable use of plant resources.

Keywords: Western Ghats, Fabaceae, Malvaceae, IUCN, Vulnerable, *Psydrax dicoccos*

KERAGAMAN DAN STATUS KONSERVASI TUMBUHAN OBAT DI KAKI BUKIT BENDUNGAN PILAVAKKAL, GHATS BAGIAN BARAT, TAMIL NADU, INDIA. Studi floristik diperlukan untuk memahami keanekaragaman dan konservasi keanekaragaman hayati hutan. Telah disadari bahwa studi tentang flora lokal atau regional jauh lebih penting daripada studi di wilayah yang luas karena eksplorasi dapat dilakukan secara intensif di wilayah kecil. Memahami keanekaragaman spesies dan pola distribusi penting untuk mengevaluasi kompleksitas dan sumber daya hutan ini. Dalam penelitian ini, keanekaragaman tumbuhan obat pada kaki bukit bendungan Pilavakkal Ghats Barat terdiri dari 127 spesies yang termasuk dalam 42 famili dan 100 marga. Fabaceae, Malvaceae dan Lamiaceae merupakan famili yang dominan dengan 23 jenis, 11 jenis dan 10 jenis. Jumlah spesies meliputi 55 herba, 23 semak, 37 pohon dan 12 pemanjat. Sebanyak 127 spesies tanaman obat penting dicatat di Bendungan Pilavakkal, Lereng Kaki Ghats Barat. Dalam daftar ini *Psydrax dicoccos* statusnya rentan, 27 spesies statusnya kurangmendapatperhatian dan *Mangifera indica* statusnya Data Deficient dan 98 spesies tumbuhanlainnya belum dievaluasi oleh IUCN. Studi ini memberikan informasi mendasar tentang flora obat dan status konservasinya di Kaki Lereng Bendungan Pilavakkal Ghats Barat. Data ini akan membantu identifikasi flora dan menjadipertimbangan kebijakan konservasi dan pemanfaatan yang berkelanjutan.

Kata kunci: Ghats Barat, Fabaceae, Malvaceae, IUCN, Rentan, *Psydrax dicoccos*

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I. INTRODUCTION

The forests of the Western Ghats of India are best representatives of non-equatorial tropical evergreen forests of the world (Pascal, 1988; Pascal, 1991). The Western Ghats cover only 5% of the country's total land area but contain more than 5,000 or 27% of the country's total plant species. The Western Ghats is one of the richest centers of endemism in India and nearly 63% of India's arborescent evergreen taxa are endemic to this region (Ramesh & Pascal, 1991). The number of endemic plant species in the Western Ghats is estimated to be about 1,500 (MacKinnon and MacKinnon, 1986). The higher levels of biodiversity and endemism have earned the area to be recognized as one among the biodiversity hotspots of the world (Myers, 1988). The floristic diversity of the Western Ghats is very significant as this hill range accommodates different vegetation types such as wet evergreen forests, moist and dry deciduous forests, montane forests, sholas, scrubs and savannas.

India is endowed with rich and diverse forest resources (Nayar & Sastry, 1987) of the more than 250,000 higher plant species on earth, more than 80,000 are medicinal. India is one of the world 12 biodiversity centres with the presence of over 45,000 different plant species. India's diversity is unmatched due to 16 different agro-climatic zones, 10 vegetation zones, 25 biotic provinces and 426 biomes. About 15,000-20,000 plants have good medicinal value (Joy, Thomas, Mathew & Skaria, 2001). Biodiversity includes diversity within species and between species, and ecosystems (Chaudhary, 1998). It is not evenly distributed everywhere, rather it varies greatly across the globe as well as within different geographical regions. The Convention of Biological Diversity defines documentation of biodiversity as one of the most prioritized tasks by the world. Biodiversity documentation is possible through extensive botanical exploration and floristic studies (Chalise et al., 2018). The floristic study refers to documentation of all plants species in a given geographical region (Simpson, 2006). Such studies help in botanical

enumeration, update nomenclature changes, add herbarium specimens in the existing herbaria and compare close or distantly related plants (Chalise et al., 2018). The results of such floristic studies mostly come in the form of floras (Palmer, Wade & Neal, 1995) which may be local, regional, country-wise and so on, or they may be in the form of checklists (Chalise et al., 2018). Floristic wealth is an indispensable part of the natural balance that interprets the effects of the total environment (Billings, 1952). Floristic composition fluctuates from one season to another season in recurring conduct over the years in a succession way. The decline of plant species changes the pattern of the species distribution in the community (Watt, 1964; Heady, 1958).

Medicinal plants which form the backbone of traditional medicine have in the last few decades been the subject of very intense pharmacological studies. This has been brought about by the acknowledgement of the value of medicinal plant as potential source of new compounds of therapeutic value and as source of new compounds in drug development. In many parts of the world medicinal plants are used for antibacterial, antifungal and antiviral activities. A plant derived drugs serve as a prototype to develop more effective and less toxic medicinal products (Manikandan et al., 2019;). Plants have been an important source of medicine for thousands of years. Use of plants for the treatment of many diseases dated back to prehistory and people of all continents have this old tradition (Manikandan et al., 2020). The traditional methods, especially the usage of medicinal plants, still play a vital role to cover the basic health needs in the developing countries and moreover, the use of herbal remedies has risen in the developed countries in the last decade. Plants have provided a source of inspiration of novel drug compounds, as plant derived medicines have made large contributions to human health and well-being. Their role is twofold namely; they provide key chemical structure for the development of new antimicrobial drugs and also as a phytomedicine

to be used for the treatment of diseases (Manikandan & Ramasubbu, 2020). Plants used for the traditional medicine contains a wide range of substance used to treat chronic as well as infectious diseases. A vast knowledge of the plants used against different illnesses may expected to have accumulated in areas where the use of plants is still of great importance (Manikandan et al., 2017). The present study was carried out to survey and document the Assessment of Medicinal Floristic Diversity and conservation status of Pilavakkal dam Foothills of Western Ghats, Tamil Nadu, India.

II. STUDY AREA AND METHOD

The present study was conducted in Srivilliputhur Pilavakkal Dam Foothills of Western Ghats, Virudhunagar District, Tamil Nadu, India. The study area of Pilavakkal Dam lies between 9°64'03"N latitude and 77°52'52"E longitude, it is situated at around 90 km from Madurai and 45 km from Virudunagar. The dam comprises 2 divisions namely the Kovilar

and Periyar Dam. The limit of the Periyar dam is 192 million cubic feet (mcft) and the Kovilar Dam is 133 mcft. From October to December, the dam will be loaded with water. The study area of Pilavakkal Dam foothills of Western Ghats is covered by scrub and dry deciduous forest and it has rich and different kinds of medicinal plant diversity (Figure 1 & 2).

Field trips were conducted frequently during summer, winter and in rainy seasons of 2019-2020. All the plant species were collected in the months of the flowering season. Field data were noted in the field diary. Collected plants were identified by referring to Flora of Presidency of Madras (Gamble, 1935; Gamble & Fischer, 1937) Flora of Tamil Nadu Carnatic (Matthew, 1981; Matthew, 1982) and matching with authentic specimens. We collected information about the uses of medicinal plants through the literature and local people. Photographs were taken and herbaria were prepared, which later were deposited at the Department of Botany, Sri Kaliswari College (Autonomous), Sivakasi.



Figure 1. Map of the Study area (Pilavakkal Dam)



Figure 2. View of Pilavakkal Dam

III. RESULT AND DISCUSSION

In the present study, the medicinal floristic diversity of Pilavakkal dam Foothills of the Western Ghats comprised of 127 species belonging to 42 families and 100 genera (Table 1; Figure 4). The total number of species includes 55 herbs, 23 shrubs, 37 trees and 12 climbers. Fabaceae, Malvaceae and Lamiaceae were dominant families with 23, 11 and 10 species, respectively (Figure 3). In this list *Psydrax dicoccos* is Vulnerable and this species is rare in this study area, 27 plants species are Least Concern, *Mangifera indica* is categorized as Data Deficient, and 98 plant species are not evaluated by the International Union for Conservation of Nature (IUCN). There is no effort of the local people to conserve the medicinal plants and there is no local wisdom regarding the sustainable use of these valuable resources.

Plant resources are presented with materials for survival, which has economic, medicinal, or forage values (Morgan, 1981). Many medicinal and economic important tree species are considered as Rare Endangered Threatened (RET) species owing to rapid agricultural and urban development, deforestation and indiscriminate collection (Manikandan et al.,

2017). As a plant species is lost from a region, the information enclosed in it will also be slowly distorted and finally become lost forever. The documentation of indigenous knowledge and conservation of a plant species, both are basic burning issues (Cunningham, 1996). The floristic study is necessary to understand the present diversity status and conservation of forest biodiversity. It has been realized that the study of local or regional flora is of much more significance than those covering big areas because explorations can be carried out intensively in small areas with damaging effect. Understanding species diversity and distribution patterns are important to evaluate the complexity and resources of these forests. Floristic studies include species lists, life form spectra, geographical distribution, and identification of threatened species that are useful for evaluating ecological issues such as biodiversity, growth capacity, conservation and regulation (Ali et al., 2018). Documenting the distribution of biodiversity is the first and most fundamental step for effective conservation and sustainable utilisation of natural resources for the future (Gaston, 2000).

Plants have been an important source of medicine for thousands of years

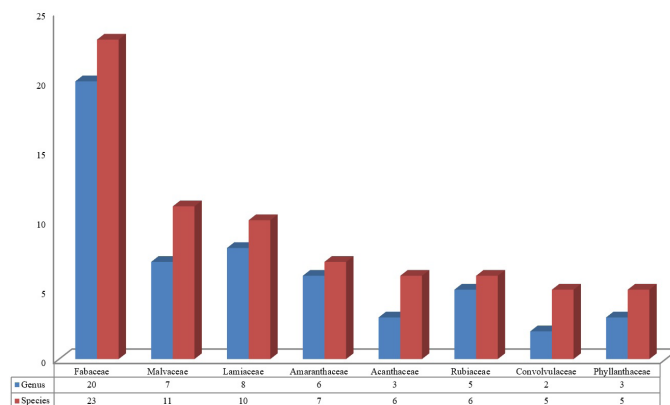


Figure 3. Dominant families with numbers of genus and species recorded in the study area

(Packiyalakshmi et al., 2017; Manikandan et al., 2020). India is a veritable emporium of medicinal and aromatic plants. It has been estimated that out of 15,000 higher plants occurring in India, 9,000 are commonly useful, of which 7,500 are medicinal, 3,900 are edible, 700 are culturally important, 525 are used for fibre, 400 are fodder, 300 for pesticide and insecticide, 300 for gum, resin and dye and 100 for incense and perfume (Anonymous, 1994). In the present study 127 medicinally important plant species were distributed in the Pilavakkal Dam Foothills of the Western Ghats and their uses are described in Table 1. These are taken internally, or applied externally in infusion, decoction, paste or powder. Most of the plants used in medicine are either mixed with other ingredients or used singly.

One hundred twenty-seven plant species were found in the area with medicinal properties. These are depleting rapidly because of unsustainable harvesting, lack of awareness, and unrestricted grazing by domestic animals from nearby villages. Nonetheless, many people from far and wide come to this area to collect medicinal plants and share their knowledge on the medicinal uses of these plants. So, proper conservation and establishment plans are needed to conserve the medicinal plant resources of this area. It would be helpful for the identification of flora and to derive conservation policies and make sustainable use of plant resources.

IV. CONCLUSION

This study provides basic information about the medicinal flora of the Pilavakkal Dam Foothills of Western Ghats, which comprised of 127 species with medicinal properties, belonging to 42 families and 100 genera. *Psydrax dicoccos* is Vulnerable in this list, 27 plants species are under the Least Concern and *Mangifera indica* comes under the Data Deficient, and 98 plants species are Not Evaluated by IUCN. . These medicinal plants are depleting rapidly because of unsustainable harvesting, lack of awareness, and unrestricted grazing by domestic animals from nearby villages. So, proper conservation and establishment plans are needed to protect the medicinal plant resources of this area. .

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Appendix 1. List of Medicinal Floristic Diversity of Pilavakkal Dam Foothills of Western Ghats

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
Acanthaceae				
1.	<i>Dicliptera paniculata</i> (Forssk.) I.Darbysh.	Herb	NE	An essential oil is obtained from the plant showed tuberculostatic activity (Raj Singh et al., 2020)
2.	<i>Justicia procumbens</i> Blume.	Shrub	NE	To treat leprosy, ulcers, headaches, gonorrhoea, and bladder infection (Chinnaperumal et al., 2012)
3.	<i>Justicia Prostrata</i> (Roxb. ex C. B. Cl.) Gamble	Herb	NE	A decoction of the root is used to treat aches and pains and sore eyes (Sanmugapriya et al., 2015)
4.	<i>Justicia tranquebariensis</i> L.f.	Herb	NE	In Comoros a leaf decoction is used as a massage cream to treat the pain of the joints. (Saritha & Brindha, 2013)
5.	<i>Ruellia patula</i> Jacq.	Herb	NE	The macerated root is used to relieve the pain of scorpion stings (Ramadevi et al., 2016)
6.	<i>Ruellia tuberosa</i> L.	Herb	NE	The people of Biharuse use the plant as a treatment of diarrhoea, cholera and dysentery. (Moronkola, et al., 2015)
Aizoaceae				
7.	<i>Trianthema portulacastrum</i> L.	Herb	NE	The bark is febrifuge and can be used as a treatment against Asthma, bronchitis. (Jason Yamaki et al., 2016)
Amaranthaceae				
8.	<i>Achyranthes aspera</i> L.	Herb	NE	Treatment of malaria and coughs (MirutseGiday & Gobena Amen, 2003)
9.	<i>Aerva javanica</i> (Burm.f.) Juss. ex Schult	Herb	NE	The leaves and seeds are used in the treatment of eye problems such as ophthalmia (Qureshi & Bhatti, 2008)
10.	<i>Alternanthera sessilis</i> (L.) R.Br. ex DC.	Herb	LC	The plant is said to be abortifacient, cholagogue, febrifuge and galactagogue (Sanoussi et al., 2015)
11.	<i>Amaranthus spinosus</i> L.	Herb	NE	The plant is used as anti-inflammatory and stomach ache (Anisuzzaman et al., 2007)
12.	<i>Amaranthus viridis</i> L.	Herb	NE	It is used in the treatment of internal bleeding, diarrhoea. (Ignacimuthu et al., 2008)
13.	<i>Gomphrena celosioides</i> Mart.	Herb	NE	A decoction of the entire plant is used to stop dysentery and inflammations (Ayyanar et al., 2010)
14.	<i>Ouret lanata</i> (L.) Kuntze	Herb	NE	The whole plant, but especially the leaves and the roots, is a powerful astringent (Upadhyay et al., 2008)
Anacardiaceae				
15.	<i>Mangifera indica</i> L.	Tree	DD	It destroys a wide range of parasitic organisms and is spermicidal (Rasingam, 2012)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
Annonaceae				
16.	<i>Monoon longifolium</i> (Sonn.) B.Xue&R.M.K.Saunders	Tree	NE	It is used to treat liver disorder such as hepatitis and jaundice. (Dattatray et al., 2021)
Apocynaceae				
17.	<i>Cascabela thevetia</i> (L.) Lippold	Tree	LC	The root is used as a diuretic to treat jaundice, enlarged spleen, gonorrhoea (Dhivya & Kalaichelvi, 2016)
18.	<i>Dregea volubilis</i> (L. f.) Benth. ex Hook. f.	Climber	NE	The ash of the flower is taken to relieve heartburn and enlarged spleen and liver (Kakrani & Saluja, 2002)
19.	<i>Hemidesmus indicus</i> (L.) R. Br.	Climber	NE	The wood ashes are used to treat general body pains (Nandy et al., 2020)
20.	<i>Pergularia daemia</i> (Forsk.) Chiov.	Climber	NE	The leaf juice has been used as a treatment for earache (Xavier et al., 2014)
21.	<i>Wrightia tinctoria</i> (Roxb.) R. Br.	Tree	LC	A bark or leaf decoction is taken to loosen the bowels, as an emetic, and is said to be an effective cure for intermittent fevers (Reddy et al., 2006)
Arecaceae				
22.	<i>Borassus flabellifer</i> L.	Tree	NE	A decoction of the twigs is used for treating swelling (Ganesh et al., 2016)
Asteraceae				
23.	<i>Parthenium integrifolium</i> L.	Herb	NE	It is used for obesity and diabetes (Shaheen et al., 2014)
24.	<i>Tridax procumbens</i> L.	Herb	NE	An infusion of the roots is used as a medicine for chest pain, the leaves to treat diarrhoea (Chiranjibi et al., 2008)
Bignoniaceae				
25.	<i>Millingtonia hortensis</i> L.f.	Tree	NE	A decoction of the seeds is used to treat rheumatism, gonorrhoea, diarrhoea and dysentery, and as a wash to treat piles (Kavitha & Mary Kensa, 2016)
Cactaceae				
26.	<i>Opuntia dillenii</i> (Ker Gawl.) Haw.	Shrub	NE	The powdered, ripe seeds are aperient and purgative (Ayyanar & Ignacimuthu, 2011)
Capparaceae				
27.	<i>Cadaba fruticosa</i> (L.) Druce	Shrub	NE	The juice of the roots and leaves is considered to be a useful treatment for diabetes (Arulappan et al., 2015)
28.	<i>Crateva religiosa</i> G.Forst.	Tree	LC	The leaves are pounded and soaked in warm water and then the solution is drunk to treat diarrhoea (Kannan et al., 2015)
29.	<i>Maernia apetalata</i> (Roth) M. Jacobs	Tree	NE	The leaves have been used to increase appetite, as an aid to digestion. (Johnson Gritto et al., 2015)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
Casuarinaceae				
30.	<i>Casuarina equisetifolia</i> L.	Tree	LC	The leaves are used as plaster to reduce swelling. (Harsha et al., 2003)
Cleomaceae				
31.	<i>Cleome gynandra</i> L.	Herb	NE	The bark is a laxative and also stimulates the appetite (Bedi, 1978)
32.	<i>Cleome viscosa</i> L.	Herb	NE	A decoction made of the roots is used in local medicine against fever (Ravindra, 2009)
Combretaceae				
33.	<i>Terminalia arjuna</i> (Roxb. ex DC) Wight & Arn.	Tree	NE	Poultices of the leaves are used to treat minor cuts and bruises (Elavarasi & Saravanan, 2012)
34.	<i>Terminalia catappa</i> L.	Tree	LC	A decoction of the whole plant is used as a treatment for conditions such as anasarca, anuria (Bhargava, 1983)
Commelinaceae				
35.	<i>Commelina benghalensis</i> L.	Herb	LC	The plant is used in piles, dysentery and eye diseases (Ayyanar & Ignacimuthu, 2009)
Convolvulaceae				
36.	<i>Evolvulus alsinoides</i> (L.) L.	Herb	NE	It serves as an antidote to snake poison (Singh, 2008)
37.	<i>Ipomoea aquatica</i> Forssk.	Herb	LC	The leaf paste is used to treat rheumatic pain, cough, fever and severe cold (Kumar, 2013)
38.	<i>Ipomoea carnea</i> Jacq.	Shrub	NE	In folks medicine, to increase fertility in women, fresh leaves are ground with <i>Oryza sativa</i> and the extract is drunk after menses (Singh et al., 2020)
39.	<i>Ipomoea pes-tigridis</i> L.	Climber	NE	The roots and leaves are often employed to alleviate fever (Shanmugam, 2012)
40.	<i>Ipomoea sagittifolia</i> Burm.f	Climber	NE	The stem, taken internally, is famed as a treatment for asthma, bronchitis and various other lung complaints (Chakraborty, 2020)
Cucurbitaceae				
41.	<i>Coccinia grandis</i> L. Voigt	Climber	NE	It is used extensively as a febrifuge and tonic. (Rasingam, 2012)
Euphorbiaceae				
42.	<i>Acalypha indica</i> L.	Herb	NE	It is serving as anthelmintic, anti-inflammation, anti-bacterial, anti-cancer, anti-diabetes, anti-hyperlipidemic, anti-obesity, anti-venom, hepatoprotective, hypoxia, and wound healing medicine (Zahidin et al., 2017)
43.	<i>Euphorbia hirta</i> L.	Herb	NE	The juice of the root is used in the treatment of fevers (Ayyanar & Ignacimuthu, 2009)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
44.	<i>Jatropha glandulifera</i> (Roxb.)	Shrub	NE	Treatment for Anorexia, Dyspepsia, Cough and Spleen (Basha et al., 2020)
45.	<i>Ricinus communis</i> L.	Shrub	NE	The leaf sap is used as a demulcent to treat gonorrhoea and cough, and is also applied to wounds and ulcers (Roy & Janbandhu, 2020)
Fabaceae				
46.	<i>Abrus precatorius</i> L.	Climber	NE	It is used to cure respiratory problems and skin infections (Garaniya & Bapodra 2014)
47.	<i>Acacia auriculiformis</i> A. Cunn. ex Benth.	Tree	LC	The gum is used externally to cure gonorrhoea (Bhasha & Reddy, 2017)
48.	<i>Albizia amara</i> (Roxb.) Boivin	Tree	LC	The root of the plants is used to the treatment of demulcent, astringent, diuretic (Ganesh et al., 2016)
49.	<i>Albizia lebbbeck</i> (L.) Benth.	Tree	NE	The leaves are used for the treatment of Jaundice, inflammation and diabetes (Kichu et al., 2015)
50.	<i>Alysicarpus monilifer</i> (L.) DC.	Herb	NE	The seed and a paste of the stem bark is used in treating ringworm (Karthikeyan et al., 2014)
51.	<i>Clitoria ternatea</i> L.	Climber	NE	Applied externally, the leaves are made into an ointment for treating skin diseases, wounds, sores, ulcers and haemorrhoids (Pulok et al., 2008)
52.	<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Tree	LC	A tincture of the seed is used in India to kill lice (Shubashini & Uma 2010)
53.	<i>Erythrina variegata</i> Linn.	Tree	LC	It is used as carminative, lessens inflammation and fever (Bhandary et al., 1995)
54.	<i>Hardwickia binata</i> Roxb.	Tree	LC	An infusion is used as a remedy for dysentery and as a blood purifier (bitter tonic) to reduce blood-sugar levels (Basha et al., 2011)
55.	<i>Indigofera linifolia</i> (L. f.) Retz.	Shrub	LC	The mashed leave are applied as a poultice on sores, boils and pimples (Savithamma et al., 2007)
56.	<i>Indigofera tinctoria</i> L.	Shrub	NE	It is used for curing sterility in women (Johnsy Mary et al., 2020)
57.	<i>Mimosa pudica</i> L.	Herb	LC	The seed oil is sometimes used as a cathartic, although it may cause strong irritation and even poisoning (Singh & Singh, 2009)
58.	<i>Peltophorum pterocarpum</i> (DC.) Backer ex K. Heyne.	Tree	NE	The juice of the leaves is used in ophthalmia (Jeeva & Femila, 2012)
59.	<i>Pongamia pinnata</i> (L.)	Tree	LC	It gives antiulcerogenic effects (Ayyanar & Ignacimuthu, 2009)
60.	<i>Prosopis juliflora</i> (Sw.) DC.	Tree	NE	It has been used for poisonous bites (Qasim et al., 2014)
61.	<i>Samanea saman</i> (Jacq.) Merr.	Tree	LC	The root is sweet and bitter-tasting, refrigerant, antifebrile (Vaidyanathan et al., 2013)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
62.	<i>Senegalia catechu</i> (L. f.) P.J.H.Hurter&Mabb	Tree	NE	The leaf sap is used to treat sores of the eyes and nose (Dinesh & Aruna, 2010)
63.	<i>Senna auriculata</i> (L.) Roxb.	Shrub	NE	They are used in the treatment of coughs, colds and bronchitis (Ignacimuthu et al., 2008)
64.	<i>Senna occidentals</i> (L.) Link	Shrub	NE	A paste of the root is applied for leucoderma (Singh & Singh, 2009)
65.	<i>Tamarindus indica</i> L.	Tree	LC	The bark is astringent, homeostatic and antirheumatic (Rasingam, 2012)
66.	<i>Tephrosia purpurea</i> L.	Herb	NE	It is used for edema, cough and aphrodisiac (Perumal Samy et al., 2008)
67.	<i>Vachellia leucophloea</i> (Roxb.) Maslin, Seigler&Ebinger	Tree	LC	The leaves are used to treat colds, rheumatism, eczema (Koche et al., 2008)
68.	<i>Vachellia nilotica</i> (L.) P.J.H.Hurter&Mabb	Tree	LC	Leaves and roots of cork tree used as antiasthmatic and antimicrobial activity. (Raj Kumar Verma, 2014)
Lamiaceae				
69.	<i>Anisomeles malabarica</i> (L.) R. Br	Herb	NE	The leaves are bitter, mildly sudorific, tonic (Shanmugam et al., 2020)
70.	<i>Endostemon viscosus</i> (Roth) M. R. Ashby	Shrub	NE	It helps to the management of toothaches, amenorrhoea, dyspepsia and sore throat (Kottaimuthu, 2008)
71.	<i>Leucas aspera</i> (Willd.) Link	Herb	NE	The flowers have been used to treat leprosy and blood diseases (Ayyanar et al., 2011)
72.	<i>Mesosphaerum suaveolens</i> (L.) Kuntze.	Herb	NE	It reduces the Hypertension (Kommidi et al., 2020)
73.	<i>Ocimum basilicum</i> L.	Herb	NE	The roots, leaves and fruits may have anthelmintic and anti-oxidant properties (Ayyanar & Ignacimuthu, 2009; Manikandan & David noel, 2019)
74.	<i>Ocimum filamentosum</i> Forssk.	Herb	NE	It is used to treat headache, cough, diarrhoea and warts. (Qwarse et al., 2018)
75.	<i>Ocimum tenuiflorum</i> L.	Herb	NE	The leaves used to treatment of bronchitis, malaria, diarrhoea, skin disease (Ayyanar & Ignacimuthu, 2011)
76.	<i>Orthosiphon aristatus</i> (Blume) Miq.	Herb	NE	The essential oils from the leaf have shown antibacterial and antifungal activity (Mina & Mina, 2017)
77.	<i>Tectona grandis</i> L.f.	Tree	NE	A decoction of the leaves is used as a wash for poisonous bites (Bhandary et al., 1995)
78.	<i>Vitex negundo</i> L.	Shrub	LC	The fruit is said to have a value in the treatment of diabetes (Morvin Yabesh et al., 2014)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
Malvaceae				
79.	<i>Abutilon indicum</i> (L.) Sweet	Shrub	NE	They were widely used in traditional medicine to prevent diseases such as diabetes, kidney stone, edema, rheumatism, hepatitis, hypertensive and jaundice. (Shubashini & Uma, 2010)
80.	<i>Corchorus capsularis</i> L.	Herb	NE	The roots are used to treat headache, as a demulcent, to cure coughs and as a vermifuge (Dutta et al., 2016)
81.	<i>Corchorus tridens</i> L.	Herb	NE	It is indicated for general bacteria, bronchitis, colitis, cold, cough, fatigue, immune depression, and non-specific infections (Choudhary et al., 2016)
82.	<i>Hibiscus vitifolius</i> L.	Shrub	NE	The leaf contains substances that have possible antimicrobial activity (Basha et al., 2011)
83.	<i>Pavonia procumbens</i> (Wright & Arn.) Walp.	Shrub	NE	The leaf extracts having high antioxidant potential (Ignacimuthu et al., 2008)
84.	<i>Pavonia zeylanica</i> (L.) Cav.	Shrub	NE	It is used to treat viral warts and chronic disease of the nervous system (Ignacimuthu et al., 2008)
85.	<i>Sida acuta</i> Burm.f.	Herb	NE	The plant is taken as an emmenagogue and oxytocic and the root is considered antibilious (Datta et al., 2014)
86.	<i>Sida cordata</i> (Burm.f.) Borss. Waalk.	Herb	NE	It is used for gargles and tooth powders (Ignacimuthu et al., 2008)
87.	<i>Sida cordifolia</i> L.	Herb	NE	The whole plant is used as an anthelmintic, antiseptic, antivenin. (Savithamma et al., 2007)
88.	<i>Sida rhombifolia</i> L.	Herb	NE	It is also used by mothers after childbirth to bring relief to painful wombs and to treat colic (Bhandary et al., 1995)
89.	<i>Sterculia foetida</i> L.	Tree	NE	The fruits have diuretic, laxative and purgative activities and also show molluscicidal and antimicrobial properties. (Putri & Basbri, 2019)
Meliaceae				
90.	<i>Azadirachta indica</i> A. Juss	Tree	LC	It is used for antiseptic, head ache, earache and ophthalmia (Ayyanar & Ignacimuthu, 2011)
Menispermaceae				
91.	<i>Cyclea peltata</i> (Lam.) Hook. f. & Thoms.	Climber	NE	The seed oil is given as a stomachic and cholagogue (medicinal agent which promotes the discharge of bile from the system, purging it downward) in the treatment of dyspepsia and cases of sluggish liver (Begum & Nath, 2000)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
Molluginaceae				
92.	<i>Mollugo verticillata</i> L.	Herb	NE	It is used to treat diarrhoea and cure ulcer (Core, 1967)
93.	<i>Trigastrotheca pentaphylla</i> (L.) Thulin	Herb	NE	The leaves have been shown to have antibacterial, antibiotic, antispasmodic and astringent (Balkrishna et al., 2018)
Moraceae				
94.	<i>Ficus benghalensis</i> L.	Tree	NE	The bark extracts applied on fracture and used in fever (Ayyanar & Ignacimuthu, 2011)
95.	<i>Ficus hispida</i> L. f.	Tree	LC	It is so effective that it is regularly used to clear the digestive tract in cases of poisoning (Bhargava, 1983)
Myrtaceae				
96.	<i>Syzygium cumini</i> (L.) Skeels	Tree	LC	It is used to cure eye sore, renal infection, cough (Dahare & Aruna et al., 2010)
Nyctaginaceae				
97.	<i>Boerhavia diffusa</i> L.	Herb	NE	It has been used as a diuretic, anti-diabetic (Aeri et al., 2014)
98.	<i>Boerhavia erecta</i> L.	Herb	NE	The plant decoction is used for treatment of skin problems such as dermatitis, eczema and pruritus (Rao et al., 2006)
Passifloraceae				
99.	<i>Passiflora foetida</i> L.	Climber	NE	The plant is strongly astringent, encouraging clotting of the blood (Ajesh et al., 2012)
Pedaliaceae				
100.	<i>Pedaliium murex</i> L.	Herb	NE	The seeds are used to cure eye diseases, gonorrhoea and gout (Balakrishnan et al., 2009)
Phyllanthaceae				
101.	<i>Flueggea leucopyrus</i> Willd.	Shrub	NE	All plant parts are said to have tonic, diuretic, stomachic and febrifuge properties (Jagtap et al., 2009)
102.	<i>Meineckia parvifolia</i> (Wight) G. L. Webster	Shrub	NE	A decoction of the whole plant is used as a treatment for fevers (Sreeja et al., 2016)
103.	<i>Phyllanthus amarus</i> Schumach. &Thonn.	Herb	NE	The juice of the leaves is used to treat cuts and wounds (Ignacimuthu et al., 2008)
104.	<i>Phyllanthus emblica</i> L.	Tree	NE	The plant is antipruritic, aphrodisiac, astringent, diuretic, emollient, febrifuge and tonic (Savithramma et al., 2007)
105.	<i>Phyllanthus maderaspatensis</i> L.	Herb	NE	The juice of the leaves is mixed with vinegar to make an anti-inflammatory and digestive remedy (Meyanungsang et al., 2015)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
Poaceae				
106.	<i>Cymbopogon citratus</i> (DC.) Stapf	Herb	NE	Various parts are used in decoction, cholera, bronchitis, dysuria. Essential oil used for anti-microbial activity (Machraoui et al., 2018; Manikandan et al., 2021)
107.	<i>Cynodon dactylon</i> (L.) Pers.	Herb	NE	It is used to treatment of headache, menstrual pain and ulcer (Ignacimuthu et al., 2008)
Rubiaceae				
108.	<i>Mitracarpus hirtus</i> (L.) DC.	Herb	NE	A tincture of the leaves is said to alleviate neuralgic pains (Rizki et al., 2019)
109.	<i>Morinda tinctoria</i> (Roxb.)	Shrub	NE	It is used to heal stomach ailments and also used as a tonic and anti-dandruff (Ayyanar & Ignacimuthu, 2009)
110.	<i>Oldenlandia umbellata</i> L.	Herb	NE	The sap is used to treat eczema, worms and ringworm (Savithramma et al., 2007)
111.	<i>Psydrax dicoccos</i> Gaertn.	Tree	VU	It is used in the treatment of gonorrhoea (Ranjithkumar et al., 2014)
112.	<i>Spermacoce hispida</i> L.	Herb	NE	Leaves and bark extracts are used for controlling blood pressure (Shubashini & Uma, 2010)
113.	<i>Spermacoce ocymoides</i> Burm.f.	Herb	NE	A decoction of the flower buds is used as a remedy for children's bedwetting and urinary complaints (Ayyanar & Ignacimuthu, 2009)
Rutaceae				
114.	<i>Toddalia asiatica</i> (L.) Lam.	Shrub	NE	The bark has been used as an astringent and in the treatment of bronchitis (Ayyanar & Ignacimuthu, 2009)
Sapindaceae				
115.	<i>Cardiospermum halicacabum</i> L.	Climber	LC	A fruit extract is used to relieve bodily pains and inflammatory problems (Shubashini & Uma, 2010)
Sapotaceae				
116.	<i>Madhuca longifolia</i> (J. Koenig, ex L.) J.F.Macbr	Tree	NE	The juice from the leaves is used traditionally to treat earache (Ayyanar & Ignacimuthu, 2009)
Simaroubaceae				
117.	<i>Ailanthus excels</i> Roxb.	Tree	NE	Various parts of the tree, such as the leaves and fruit, contain tannins and are astringent (Savithramma et al., 2007)
Solanaceae				
118.	<i>Solanum melongena</i> var. <i>isanum</i> (L.)	Herb	NE	It is used to boost digestive function and to treat fevers (Ignacimuthu et al., 2008)

No.	Name of the Species	Habit	IUCN Status 2021-1	Medicinal uses
119.	<i>Solanum pubescens</i> Willd.	Shrub	NE	The leaves are diuretic and are applied in the treatment of oedema, jaundice, painful discharge of urine and dropsy (Sasi & Rajendran, 2012)
120.	<i>Solanum virginianum</i> L.	Shrub	NE	The stems are used in the treatment of scabious skin diseases and psoriasis (Sadaf et al., 2014)
Typhaceae				
121.	<i>Typha angustifolia</i> L.	Herb	NE	They are used as a treatment against bronchial catarrh, dysentery, and diarrhoea (Punnam Chander et al., 2015)
Ulmaceae				
122.	<i>Holoptelea integrifolia</i> (Roxb.) Planch.	Tree	NE	The whole plant is used as a mild laxative medicine and also as stomachic, antiseptic and emmenagogue. (Raj Kumar Verma, 2014)
Verbenaceae				
123.	<i>Gmelina arborea</i> (Roxb.) ex Sm.	Tree	LC	The leaves have been mixed with oil and used as a poultice on sores (Murtem and Pradeep, 2016)
124.	<i>Lantana camara</i> L.	Shrub	NE	The pods and foliage are a protein-rich fodder source. (Ignacimuthu et al., 2008)
125.	<i>Priva cordifolia</i> (L. f.) Druce	Herb	NE	The root has been used to treat tuberculosis and is also said to cure impotence (Ignacimuthu et al., 2008)
Vitaceae				
126.	<i>Cissus quadrangularis</i> L.	Climber	NE	The aromatic leaves are astringent, febrifuge, sedative, tonic and vermifuge (Reddy et al., 2016)
Zygophyllaceae				
127.	<i>Tribulus terrestris</i> L.	Herb	LC	The seeds are anthelmintic, aphrodisiac, astringent and febrifuge (Ayyanar & Ignacimuthu, 2011)

Appendix 2. Medicinal Floristic Diversity of Pilavakkal Dam Foothills of Western Ghats



Wrightia tinctoria



Ficus hispida



Dregea volubilis



Albizia amara



Meineckia parvifolia



Mollugo verticillata





Ipomoea sagittifolia



Mimosa pudica



Spermocoe ocyroides



Endostemon viscosus



Cascabela thevetia



Ipomoea pes-tigridis