



Walayar Region medicinal and aromatic plant diversity: Ethnobotanical documentation and ecological insights

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Abstract

The present study aimed to document the medicinal and aromatic plants of the Walayar region, Kerala, India. Repeated field surveys were conducted between August and September 2024 to record the floristic diversity and ethnobotanical significance of the area. A total of 50 plant species belonging to 27 families were documented. Among these, the families Fabaceae and Lamiaceae were the most dominant. Leaves were identified as the most frequently utilized plant part for the treatment of various ailments, including fever, common cold, cough, asthma, rheumatism, jaundice, ulcers, diabetes, wounds, and skin disorders. Of the documented species, nine exhibited known toxic properties, fourteen were traditionally used for women's health and reproductive care, twelve possessed industrial and commercial importance, and thirty-six were identified as invasive species. In addition, six species were found to fall under different conservation categories according to the IUCN Red List. The findings emphasize the significance of ethnobotanical documentation in conserving traditional knowledge, promoting sustainable utilization of plant resources, and supporting future pharmacological and bioprospecting research for the development of novel herbal therapeutics. The documented medicinal and aromatic plants represent valuable biological resources that contribute to biodiversity conservation and the preservation of indigenous knowledge for future generations.

Keywords: Walayar, ethnobotany, medicinal plants, aromatic plants, bioprospecting, biodiversity conservation

Introduction

Medicinal and aromatic plants constitute an invaluable component of biodiversity and have been utilized for centuries in traditional healthcare systems for the prevention and treatment of various human ailments. These plants are rich sources of bioactive compounds, essential oils, and secondary metabolites that contribute significantly to pharmaceutical, nutraceutical, cosmetic, and industrial applications (Ernst, 2005; Dobson, 1995) [5, 7]. Despite rapid advances in modern medicine, medicinal plants continue to serve as an important source of primary healthcare for a large proportion of the world's population and provide promising leads for the discovery of novel therapeutic agents.

Ethnobotanical documentation plays a crucial role in preserving indigenous knowledge and identifying plant resources with medicinal, economic, and ecological importance (Heinrich, 1999) [6]. Traditional knowledge accumulated by local and tribal communities over generations has contributed substantially to the utilization and conservation of medicinal plants. Systematic documentation of these resources is therefore essential for biodiversity conservation, sustainable utilization, scientific validation, and future pharmacological investigations (Venkatasamy *et al.*, 2010^[8]; Arunachalam & Parimelazhagan, 2011; Ayyanar & Ignacimuthu, 2011) [11, 12].

India is recognized as one of the world's megadiverse countries and harbours a rich diversity of medicinal flora distributed across various ecosystems. Among these, the Western Ghats is a globally recognized biodiversity hotspot supporting numerous endemic and medicinal plant species with significant ecological and therapeutic value (Nair &

Jayakumar, 2003) [2]. The Walayar region, situated in the southern Western Ghats along the Kerala–Tamil Nadu border, comprises diverse habitats including dry deciduous forests, scrub vegetation, and moist forest ecosystems that support a wide range of medicinal and aromatic plant species. The region also sustains traditional knowledge associated with the utilization of these plants for the treatment of fever, respiratory disorders, diabetes, skin diseases, wounds, rheumatism, jaundice, and other common ailments.

Although several ethnobotanical studies have been conducted in different parts of the Western Ghats, comprehensive documentation of the medicinal and aromatic plant diversity of the Walayar region remains limited. In addition, information regarding toxic species, plants used in women's health, industrially important taxa, invasive species, and conservation status is scattered and inadequately documented.

Therefore, the present study was undertaken to document the medicinal and aromatic plant diversity of the Walayar region, Kerala, and to evaluate their traditional medicinal uses, conservation status, toxic properties, industrial significance, and ethnobotanical importance. The documented information will contribute to the preservation of traditional knowledge, biodiversity conservation, sustainable utilization of plant resources, and future bioprospecting and pharmacological research for the development of novel herbal therapeutics.

Materials and Methods

1. Study Area

The present study was conducted in the Walayar region of Palakkad district, Kerala, situated along the southern

Western Ghats on the Kerala–Tamil Nadu border. The study area extends over approximately 12,500 ha, including about 8,300 ha in Kerala and 4,200 ha in Tamil Nadu, and lies at an elevation of 370–450 m above mean sea level. Geographically, the region is located between 10°77'N latitude and 76°51'E longitude. Walayar is characterized by tropical

semi-evergreen and dry deciduous vegetation, interspersed with scrub forests, grasslands, agricultural fields, and riparian habitats associated with the Walayar River (Fig.1). The area receives an annual rainfall of 1,500–2,200 mm and experiences a tropical climate that supports rich medicinal and aromatic plant diversity (Champion & Seth, 1968; Venkatachalapathi *et al.*, 2018) [1, 17].



Fig 1: Study area map of the Walayar region, Palakkad district, Kerala, India.

2. Field Survey and Plant Collection

Repeated field surveys were carried out from August to September 2024 covering different habitats of the Walayar region. Medicinal and aromatic plant species were documented through direct field observations and systematic sampling. Voucher specimens of representative species were collected, photographed, and processed using standard herbarium techniques for further identification.

3. Plant Identification and Documentation

The collected specimens were identified using standard regional floras, including *The Flora of the Presidency of Madras* (Gamble & Fischer, 1935) [3] and *The Flora of Tamil Nadu Carnatic* (Matthew, 1983) [4], together with available taxonomic literature and online botanical databases. Scientific names were verified using accepted nomenclature, and voucher specimens were deposited in the Herbarium of the Department of Botany, Nirmala College for Women, Coimbatore.

4. Data Analysis

The documented species were classified according to their family, growth habit, plant parts used, medicinal applications, industrial importance, toxic properties, women's health applications, invasive status, and conservation status. Conservation categories were assigned based on the International Union for Conservation of Nature (IUCN) Red List. The collected data were compiled and analyzed descriptively, and the frequency of medicinal uses and distribution of plant families were summarized using tables and graphical representations.

Results

A floristic survey conducted in the Walayar region documented 50 medicinal and aromatic plant species

belonging to 27 families (Table 1). Detailed information on the botanical name, family, vernacular name, growth habit, useful plant parts, and medicinal uses of each species is presented in Table 1.

Among the documented families, Fabaceae was the most dominant with six species, followed by Lamiaceae (five species), Euphorbiaceae (four species), and Commelinaceae (three species), while the remaining families were represented by one or two species. Based on growth habit, herbs constituted the major life form (27 species), followed by trees (12 species), shrubs (9 species), and climbers (2 species).

The documented species are traditionally used for the treatment of various ailments including fever, common cold, cough, asthma, rheumatism, jaundice, ulcers, diabetes, wounds, and skin disorders. Leaves were the most frequently utilized plant part, followed by roots, whole plants, stems, seeds, fruits, bark, and flowers.

A total of 16 plant species were documented for women's wellness and reproductive healthcare (Fig. 2). These included species used for menstrual regulation, postpartum care, pregnancy support, reduction of vaginal discharge, and the management of polycystic ovary syndrome.

The survey also identified seven toxic plant species, namely *Datura metel*, *Parthenium hysterophorus*, *Phytolacca octandra*, *Calotropis procera*, *Senna obtusifolia*, *Solanum trilobatum*, and *Croton hirtus* (Table 2), which contain biologically active compounds that require careful handling and proper utilization.

Among the documented flora, 36 species were native or indigenous, 13 species were invasive, and two species were introduced or naturalized (Figure 3). In addition, 18 plant species were recognized for their industrial and commercial applications, including insect repellents, textiles, agriculture,

handicrafts, fuel, beverages, cosmetics, food products, and construction materials (Table 3). Several documented species were also found to fall under different IUCN conservation categories, highlighting the conservation

Importance of the medicinal and aromatic plant diversity of the Walayar region. The present documentation provides baseline information for future ethnobotanical, taxonomic, phytochemical, pharmacological, and conservation studies.

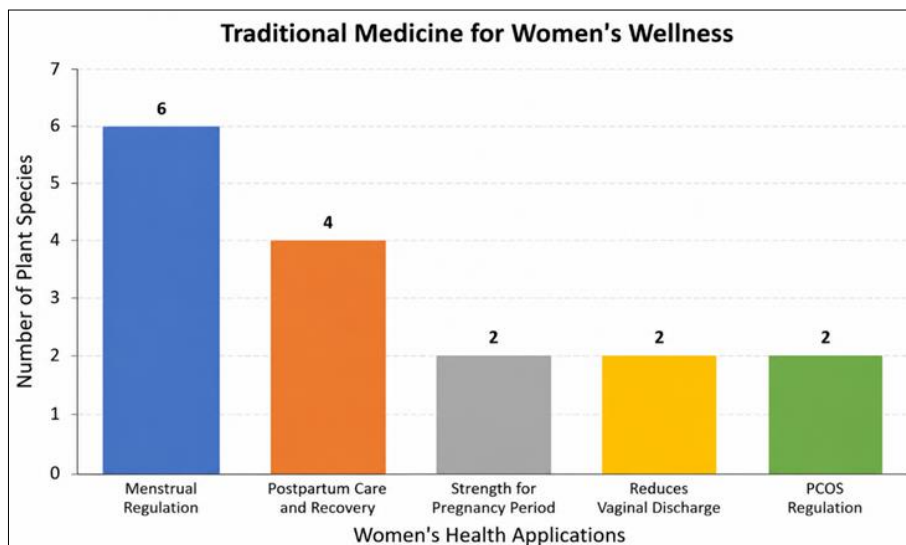


Fig 2: Medicinal plants used for women's health and reproductive wellness

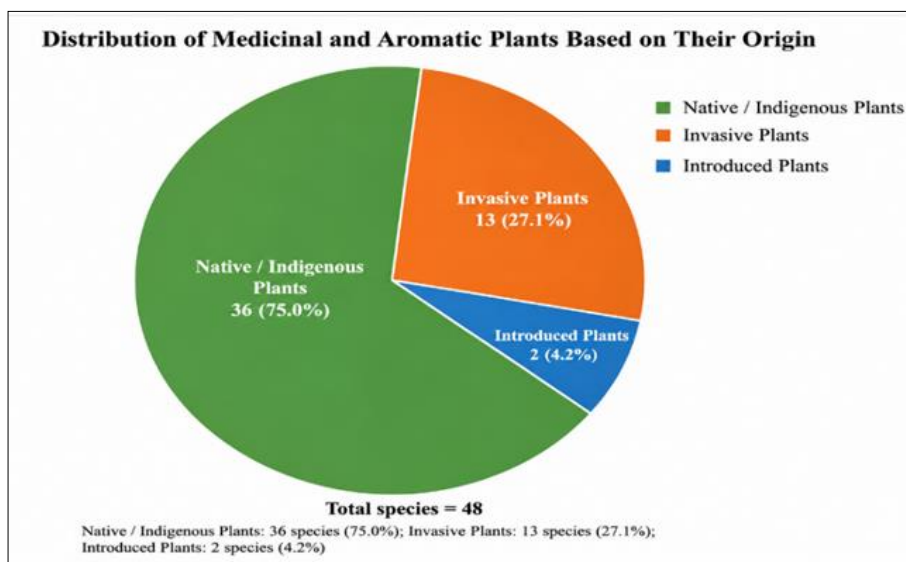


Fig 3: Distribution of native, invasive, and introduced medicinal plant species documented in the Walayar region

Table 1: Documented medicinal and aromatic plant species with family, vernacular name, habit, parts used, and medicinal uses.

S.NO	Scientific Name	Vernacular Name	Family	Habit	Parts used	Medicinal uses	Reference
1.	<i>Acalphya indica L.</i>	Kuppaimeni	Euphorbiaceae	Herb	Leaves, stem	Skin Infections, Anti-inflammatory	https://link.springer.com
2.	<i>A. capitata Willd.</i>	Alder leaved cat tail	Euphorbiaceae	Herb	Leaves	Diabetic, Leprosy	https://link.springer.com
3.	<i>Aerva lanata (L.)</i>	Poolai poo	Amaranthaceae	Herb	Leaves, Roots	Diabetes, Cough, Skin diseases.	https://www.nif.org.in
4.	<i>Alternanthera sessilis (L.)</i>	Ponnankanni	Amaranthaceae	Herb	Leaves	Eye problems, Ulcer, Hair growth	https://powo.science.kew.org
5.	<i>Anisochilus carnosus (L.f.) Wall.</i>	Karppura valli	Lamiaceae	Herb	Leaves	Cold, Gastric ulcer, Fever	https://www.sciencedirect.com
6.	<i>Ballota nigra L.</i>	Black horehound	Lamiaceae	Herb	Whole plant	Sleep disorder, Wound healing	https://www.webmd.com
7.	<i>Bauhinia malabarica Roxb</i>	Puliyatthi	Fabaceae	Tree	Leaves, Stem	Diuretic, Wound healing	https://link.springer.com
8.	<i>Boehmeria cylindrical (L.)</i>	False nettle	Utricaceae	Herb	Leaves	Liver fibrosis	https://www.nif.org.in

9.	<i>Calotropis procera</i> (Ait.)R.Br	Vellaerukku	Apocynaceae	Shurb	Leaves, latex	Diarrhoea, Skin disease.	https://www.webmd.com
10.	<i>Canavalia ensiformis</i> (L.) DC.	Thambattai	Fabaceae	Climber	Pods and seeds	Animal food, Bone growth, Back pain	https://www.sciencedirect.com
11.	<i>Cardiospermum halicacabum</i> L.	Mudakattan	Sapindaceae	Climber	Whole plant	Rhumatism, Nervous disorder	https://pubmed.ncbi.nlm.nih.gov
12.	<i>Cayratia pedata</i> (Lam.)	Kattu pirandai	Vitaceae	Shurb	Leaves	Diarrhea, Ulcer	https://www.worldfloraonline.org
13.	<i>Cleome viscosa</i> L.	Naikadugu	Cleomaceae	Herb	Leaves, Roots	Antibacterial, Rheumatic	https://pmc.ncbi.nlm.nih.gov
14.	<i>Coleus argentatus</i> (S.T.Blake)	Silver spurflower	Lamiaceae	Shurb	Leaves	Malaria, Chronic disease	https://pmc.ncbi.nlm.nih.gov
15.	<i>Croton hirtus</i> L 'He'r.	Hairy croton	Euphorbiaceae	Herb	Stem, Leaves	Gastro disorder, Diabetes	https://www.scielo.br
16.	<i>Cynodon dactylon</i> (L.) Pers.	Arugam pull	Poaceae	Herb	Whole plant	Coolant, Expectorant	https://powo.science.kew.org
17.	<i>Cyperus rotundus</i> L.	Korai pull	Cyperaceae	Herb	Whole plant	Inflammation, Malaria	https://www.sciencedirect.com
18.	<i>Dasiphora fruticosa</i> (L.)	Shrubby cinquefoil	Rosaceae	Herb	Root, Leaves	Indigestion, Astringent	https://www.natural.medicinalherb.net
19.	<i>Datura metal</i> L.	Oomatthai	Solanaceae	Shrub	Leaves, Flower	Asthma, Epilepsy, Fever	https://www.sciencedirect.com
20.	<i>Eclipta prostrate</i> (L.) L.	Karisalankanni	Asteraceae	Herb	Leaves, Stem	Hair growth, Respiratory problem	https://pmc.ncbi.nlm.nih.gov
21.	<i>Holarrhena pubescens</i> Wall.ex G. Don	Kudasappalai	Apocynaceae	Tree	Leaves, Bark, Seeds	Anemia, Jaundice, Stomach pain	https://pmc.ncbi.nlm.nih.gov
22.	<i>Hydnocarpus pentandrus</i> (Buch.-Ham.)	Maravattai	Achariaceae	Tree	Bark, Leaves	Leprosy, Skin disorders.	https://tropical.theferns.info
23.	<i>Lantara camara</i> L.	Unni chedi	Verbenaceae	Shurb	Leaves, Flower	Wound healing, Fever, cough	https://www.researchgate.net
24.	<i>Laportea Canadensis</i> (L.) Wedd.	Wood nettle	Utricaceae	Herb	Whole plant	Fever, Diuretic	https://pfaf.org
25.	<i>Mercuialis annua</i> L.	Annual mercury	Euphorbiaceae	Herb	Whole plant	Rheumatism, Gall bladder, Diarrhoea	https://www.neist.res.in
26.	<i>Mesosphaerum suaveolens</i> (L.)Poit.	Hyptis	Lamiaceae	Herb	Whole plant	Headache, Reduce labor pain	https://pmc.ncbi.nlm.nih.gov
27.	<i>Mimosa pudica</i> L	Thotta sinungi	Mimosaceae	Shrub	Roots, leaves	Dysentery, Skin wounds, Stop bleeding.	https://www.researchgate.net
28.	<i>Mitracarpus hirtus</i> (L.)DC.	Tropical girdlepod	Rubiaceae	Herb	Leaves	Toothache, Headache, Dyspepsia	https://www.researchgate.net
29.	<i>Murdannia semiteres</i> (Dalzell) santapau	Little glory	Commelinaceae	Herb	Fruit	Lung disorder	https://www.neist.res.in
30.	<i>M.spirata</i> (L.)G.Bruckn.	Dewflower	Commelinaceae	Herb	Whole plant	Leprosy, Skin infections	https://www.natureinfo.com
31.	<i>Parthenium hysterophorus</i> L.	Malli kilangu pull	Asteraceae	Herb	Leaves	Rhumatic, Diarrhoea	https://pubmed.ncbi.nlm.nih.gov
32.	<i>Phytolacca octandra</i> L.	Pokeweed	Phytolaccaceae	Herb	Leaves, Fruit	Rhumatism	https://www.neist.res.in
33.	<i>Polygonum aviculare</i> L.	Altrallari	Polygonaceae	Herb	leaves	Skin infection, Inflammation	https://www.neist.res.in
34.	<i>Quercus polymorpha</i> Schtdl. &Cham.	Karuvali maram	Fagaceae	Tree	Leaves, Bark	Anti-inflammatory, Diarrhea	https://pmc.ncbi.nlm.nih.gov
35.	<i>Senna auriculata</i> (L.)	Avaram poo	Fabaceae	Shurb	Whole plant	Asthma, Diabetes,	https://www.sciencedirect.com
36.	<i>S. obtusifolia</i> (L.)	Chirutakarai	Fabaceae	Shurb	Whole plant	Liver protection, Diuresis	https://www.sciencedirect.com
37.	<i>Seasum indicum</i> L.	Ellu	Pedaliaceae	Herb	Seed	Anti -oxidant, Skin infection	https://www.sciencedirect.com
38.	<i>S. radiatum</i> L.	Karuppu ellu	Pedaliaceae	Herb	Seed	Constipation, Bruises.	https://www.nparks.gov
39.	<i>Solanum trilobatum</i> L.	Thoothuvalai	Solanaceae	Herb	Whole plant	Digestive, Constipation	https://www.researchgate.net
40.	<i>Sphagneticola trilobata</i> (L.) Pruski	Manjal karisalankanni	Asteraceae	Herb	Whole plant	Wound infection, Ulcer	https://www.researchgate.net

41.	<i>Stringa angustifolia</i> (D. Don) C.J	Witchweed	Orobanchaceae	Herb	Whole plant	Cancer, Malaria	https://www.sciencedirect.com
42.	<i>Stylosanthes humilis</i> kunth	Pencil poo	Fabaceae	Shurb	Leaves	Cattle feed, Kidney pain relief	https://www.nparks.gov
43.	<i>Tectona grandis</i> L.f.	Thekku	Lamiaceae	Tree	Whole tree	Sedative, Liver, Urinary problems	https://www.natureinfo.com
44.	<i>Tephrosia purpurea</i> (L.) Pers.	Kolinchi	Fabaceae	Shurb	Whole plant	Asthma, Spleen disease	https://www.researchgate.net
45.	<i>Tradescantia pallida</i> (Rose) D.R Hunt	Purple herat	Commelinaceae	Herb	Leaves	Inflammation, Sore eye	https://www.natureinfo.com
46.	<i>Tribulus terrestris</i> L.	Neerunchi mul	Zygophyllaceae	Herb	Fruits, Leaves, Root	Chest pain, Heart problems,	https://www.researchgate.net
47.	<i>Urena lobata</i> L.	Ottuthuthi	Malvaceae	Shurb	Whole plant	Diabetes, Dysentery	https://clinphytoscience.springeropen.com
48.	<i>Vicia hirsuta</i> (L.) Gray	Hairy vetch	Fabaceae	Tree	Whole plant	Wound healing, Infection	https://www.sciencedirect.com
49.	<i>Vitex negundo</i> L	Notchi	Verbenaceae	Erect shrub	Leaves, Flower	Pain relief, Asthma, Sore throat.	https://www.sciencedirect.com
50.	<i>Zizyphus mauritiana</i> Lam	Elandhai	Rhmnaceae	Tree	Roots, Bark, Leaves	Small pox, Eye diseases, Eye lotion.	https://www.sciencedirect.com

Table 2: Toxic plant species documented in the Walayar region

S. N	Scientific Name
1	<i>Calotropis procera</i> (Aiton) Dryand.
2	<i>Croton hirtus</i> L'Hér.
3	<i>Datura metel</i> L.
4	<i>Parthenium hysterophorus</i> L.
5	<i>Phytolacca octandra</i> L.
6	<i>Senna obtusifolia</i> (L.) H.S.Irwin & Barneby
7	<i>Solanum trilobatum</i> L.

Table 3: Industrially important medicinal and aromatic plants and their applications

S.N	Industrial/Commercial Application	No. of Plant Species	Plant Species
1	Insect repellent	3	<i>Vitex negundo</i> , <i>Calotropis procera</i> , <i>Cyperus rotundus</i>
2	Cultural use	1	<i>Cynodon dactylon</i>
3	Textile	2	<i>Urena lobata</i> , <i>Phytolacca octandra</i>
4	Agriculture	1	<i>Tephrosia purpurea</i>
5	Handicrafts	3	<i>Lantana camara</i> , <i>Aerva lanata</i> , <i>Cardiospermum halicacabum</i>
6	Fuel	2	<i>Croton hirtus</i> , <i>Hydnocarpus pentandrus</i>
7	Beverages	2	<i>Solanum trilobatum</i> , <i>Tribulus terrestris</i>
8	Food	1	<i>Sesamum indicum</i>
9	Cosmetics	2	<i>Eclipta prostrata</i> , <i>Tradescantia pallida</i>
10	Shelter/Construction	1	<i>Tectona grandis</i>

Discussion

The present study documents 50 medicinal and aromatic plant species belonging to 27 families from the Walayar region, highlighting the rich floristic diversity and ethnobotanical significance of this part of the southern Western Ghats. Similar studies conducted in the Walayar landscape and other regions of the Western Ghats have demonstrated that the area serves as an important repository of medicinal plant resources and traditional knowledge (Venkatachalapathi *et al.*, 2018) [17]. The documentation of these species provides valuable baseline information for biodiversity conservation and future pharmacological investigations.

Among the documented families, Fabaceae was the dominant family, followed by Lamiaceae, Euphorbiaceae, and Commelinaceae. Similar dominance of Fabaceae and Lamiaceae has been reported in previous ethnobotanical investigations from Walayar and other parts of the Western

Ghats, which may be attributed to the abundance of bioactive secondary metabolites and essential oils present in these families (Venkatachalapathi *et al.*, 2018; Sanjeev *et al.*, 2015) [14, 17]. Members of these families are widely recognized for their medicinal, aromatic, and therapeutic properties and continue to play an important role in traditional healthcare systems.

Life-form analysis revealed that herbs constituted the largest proportion of documented medicinal plants, followed by trees, shrubs, and climbers. This observation agrees with earlier reports from the Western Ghats and other tropical regions, where herbaceous species are commonly utilized because of their wide distribution, easy accessibility, rapid regeneration, and ease of collection (Giday *et al.*, 2010; Pushpakarani & Natarajan, 2014; Swapna, 2015) [9, 15, 16]. The predominance of herbs further emphasizes their importance as readily available sources of traditional medicines.

Leaves were the most frequently utilized plant part for medicinal preparations, followed by roots, whole plants, stems, seeds, fruits, bark, and flowers. Similar findings have been reported by Gonzalez *et al.* (2010), Ayyanar and Ignacimuthu (2011), and Amjad *et al.* (2015) ^[10, 12, 13], who observed that leaves are preferred because they are easily harvested without causing permanent damage to the plant and are rich in photosynthetically derived bioactive compounds responsible for therapeutic activity.

The documentation of sixteen plant species associated with women's wellness and reproductive healthcare demonstrates the continued reliance on traditional herbal remedies for menstrual regulation, postpartum recovery, pregnancy support, and other gynecological conditions. Comparable observations have been reported from several tribal communities in India, where medicinal plants continue to be an affordable and culturally accepted source of primary healthcare for women. The documented species therefore represent valuable resources for future phytochemical and pharmacological validation.

Seven toxic plant species were also recorded during the present investigation. Although these plants possess medicinal importance, their biologically active constituents may produce adverse effects when used improperly. The documentation of toxic species is therefore equally important for promoting safe traditional practices and increasing public awareness regarding their appropriate utilization.

The present survey further identified native, invasive, introduced, industrially important, and conservation-priority plant species, reflecting the ecological complexity of the Walayar region. The predominance of native medicinal flora indicates the rich biodiversity of the area, whereas the occurrence of invasive and introduced species highlights the need for continuous ecological monitoring and habitat management. In addition, the documentation of industrially useful plants demonstrates their potential applications in agriculture, textiles, cosmetics, food products, construction materials, handicrafts, and natural insect repellents, thereby supporting sustainable utilization of plant resources.

Overall, the present study confirms that the Walayar region is an important reservoir of medicinal and aromatic plant diversity. Systematic documentation of these species contributes to the preservation of traditional knowledge, supports biodiversity conservation, and provides a scientific foundation for future taxonomic, phytochemical, pharmacological, and bioprospecting studies aimed at developing novel herbal therapeutics and promoting sustainable management of plant resources.

Conclusion

The present study documented 50 medicinal and aromatic plant species belonging to 27 families from the Walayar region, emphasizing their ethnobotanical, ecological, and economic importance. The documented species are traditionally used for the treatment of various ailments and include plants associated with women's healthcare, industrial applications, toxic properties, and conservation significance. The predominance of native medicinal flora highlights the rich plant diversity of the region and the need

for its sustainable utilization and conservation. This documentation serves as a valuable baseline for future taxonomic, ethnobotanical, phytochemical, and pharmacological studies while contributing to the preservation of traditional knowledge and biodiversity in the Walayar region.

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