

**FLORISTIC STUDIES ON FERNS AND LYCOPHYTES OF
THAZHAVA GRAMA PANCHAYAT, KOLLAM**

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ABSTRACT

Pteridophytes are an ancient group of plants, characterised as a significant plant group in the earth as they are with a large number of relict and endemic taxa. India is one among the megadiverse countries, of which western ghats and Srilanka are regarded as one of the hotspot of the total 34 global hotspots. Since some species exhibit large complexities, in an overall view this plant group is facing the threat of vulnerability and extinction. In this condition a floristic assessment is necessary to determine the present status of plant distribution. The Present work is on the diversity and taxonomy pteridophytes of Thazhava panchayath of kollam district. About 26 species of pteridophytes were collected from the study area; which comes under 10 families. In which pteridaceae is the largest family with 6 genus and 10 species. Among the collected species most species are included in least concern category; *Salvinia molesta* included in Invasive Species Specialist Group and *Pteris perrottetii* is endemic to south India according to IUCN.

INTRODUCTION

Pteridophytes, first colonised vascular cryptogams, widely distributed all over the world. They evolved about 400 million years ago in the Silurian period and become dominant in Devonian period. They are connecting link between thallophytes and spermatophytes. Free sporing vascular plants with independent gametophytic and sporophytic generation comprises two distinct evolutionary lineages; lycophytes and ferns (Kenrick & Crane, 1997; Pryer et al., 2001; Hauffler et al., 2016). Recent studies on the phylogeny of vascular plants, Lycophytes (less than 1500 spp.) are separated from other vascular plants (euphyllophytes). Euphyllophytes comprises spermatophytes (seed plants) and monilophytes (ferns) (PPG I, 2016).

There are about 12, 000 species of Pteridophytes in the world and about 9% of them are found in India (Dixit 1983). Indian Pteridophytic flora includes 34 families, 144 genera and more than 1100 species of which 235 species are endemic (Chandra, 2008). The World Conservation Monitoring Centre at Cambridge, England, listed 1650 threatened species of Pteridophytes worldwide (Jermy, 1990). Several studies have been listed 17 spp. (Jain & Sastry, 1980), 25 spp. (Dixit, 1983), 104 spp. (Bir, 1987) and 414 spp. (Chandra, 2008) rare and endangered Pteridophytes from different regions of India. Madhusoodanan (1991) and Manickam (1995) reported 44 rare and endangered species from the Western Ghats of South India. Maridass and Raju (2010) listed 272 species of ferns and fern allies belonging to 95 genera and 34 families from the Southern Western Ghats region.

Pteridophytes represent about 4% of all vascular plant species on earth and inhabit nearly all types of tropical, subtropical, temperate and boreal ecosystems. In India, Pteridophytic diversity is extremely rich due to the variation in eco-climatic conditions, soil types and altitude. Most of the Ferns and Lycophytes vigorously flourish during the rainy season, almost all the species produce new fronds and become fertile during August to September. With the beginning of the winter season, all the ferns turn dormant period. The aerial parts die off completely or partially giving sudden disappearance of these species. But the rhizomes covered by leafy bases, scales and hairs help them to overcome unfavourable season and become active with the next favourable.

Pteridophytes are economically very important. The pteridophytes have long been known for their medicinal and therapeutic utility. Many of them are used as food, medicines, fertilizer, horticultural plants etc. Starch is obtained from the pulpy apical part of certain species of Angiopteris, Marattia etc. Sporocarp of Marsilea drummondii are ground to a paste to make bread. Some pteridophytes are traditionally in practice in ayurvedic system of medicines. The Pteris

vittata commonly called “Bracken fern” has also shown antimicrobial activities against a number of gastro-intestinal bacterial strain. *Cyathea contaminans*, *C.felina*, *Angiopteris*, *Marattia*, so many species of *Pteris* etc are of high aesthetic value. *Azolla pinnata* (goddess of fertility), *Marsilea*, *Salvinia* etc have enhanced agricultural productivity.

Tribes routinely use fronds and dried rhizomes of pteridophytes as a source of food, extract from various parts, and as a medicine for various ailments. *Adiantum capillus-veneris* L., *Adiantum philippense* L., *Angiopteris evecta* Hoffm., *Botrychium lunaria* Sw., *Botrychium ternatum* Sw., *Botrychium virginianum* Sw., *Dicranopteris linearis* (Burm.f.) Underw., *Helminthostachys zeylanica* L., *Lygodium flexuosum* (L.) Sw., *Marattia salicina* Sm., *Ophioglossum reticulatum* L., *Ophioglossum vulgatum* L. are reported as ethnobotanically important pteridophytes (Srivastava, 2007). Ethnomedicinal uses of 61 species of pteridophytes from Western Ghats (Benjamin & Manickam, 2007) and 51 species pteridophytes of Arunachal Pradesh (Benniamin, 2011) have been studied.

Although devoid of flowers, Ferns and Lycophytes have full potentiality to be grown as ornamental plants because of their aesthetic value due to elegant foliage of varying heights, shapes and texture that grace them with delicate beauty. Majority of them can be exploited as ornamental plants since many of them can be grown well in shade and moist conditions. They can be grown as indoor plants or outdoors under various shade levels. The ornamental foliage of ferns vary from simple strap shaped fronds to the plumose froth of finely divided leaves. Due to their diverse habitats, they can be grown well on the ground or on pots, as epiphytes, on tree trunks, or on hanging baskets, or on rocks as lithophytes. Here there is ample opportunity for the floriculture industry.

In assessing the biodiversity of the Earth, taxonomy plays an important role. The taxonomy provides a basic understanding of the nature and component of biodiversity, as well as information on the naming, distribution, ecology, and utility of various species that are essential for decision making in sustainable use and conservation. The identification of Pteridophytes is not easy as compared to the Angiosperms, which provides clear floral keys. The species of Pteridophytes are distinguished by their overall morphological features, such as the shape, size, location of the sori, etc. Later stealar anatomy, venation, origin of sorus, indusium, development of sporangium, scales, hairs, gland on the indusium, and spore morphology were used to identify the species.

Being the second-largest group of vascular plants, Pteridophytes plays an important role in the Earth's plant diversity as a significant and dominant component of many plant communities. More than 300 Species of fern and fern allies are reported from the Western Ghats (Manickam & Irudayaraj, 1988), among this more than 250 species from Kerala. In Kerala, Ansary, 1981 (Kasaragod division, Cannanore district); Rajesh, 2001 (Periyar tiger reserve); Sujanapal & Sasidharan, 2009 (Parambikulam Wildlife Sanctuary); Mini, 2010 (Wayanad District); Prajeesh et al 2014 (wetland paddy fields of Wayanad district); Vijisha and Rajesh, 2015 (Aralam wildlife sanctuary); Rekha and Krishnan, 2017 (Attoor beat of Akamala forest station, Thrissur district); Sonia and Nisha, 2017 (Vagamon kurisumala); Kumar & Udayan, 2018 (Sacred Groves in Chalavara Grama Panchayath, Palakkad District) has been documented the Pteridophytic wealth. Though the Pteridophyte diversity of Kerala is rich and diverse, it is not yet fully explored and understood among the scientific community. In this scenario, this study aimed for the collection, identification and documentation of the Ferns and Lycophytes from Thazhava Gramapanchayat, Kollam district, Kerala.

AIMS AND OBJECTIVES

- To Collect the Ferns and Lycophytes of Thazhava Gramapanchayath.
- To identify and enumerate the Ferns and Lycophytes of Thazhava Gramapanchayath based on PPG I system of classification.
- To analyze the threatened and endemic pteridophytes of Thazhava Gramapanchayath and give importance to their conservation.

REVIEW OF LITERATURE

WORKS ON PTERIDOPHYTA OF THE WORLD

Lipika *et al.*, (2022) documented pteridophytic flora of rajshahi district, Bangladesh with special references to their medicinal potential and distribution. A total of 20 species under 17 genera of the 14 families were collected and identified. According to their habitat, the pteridophytes of Rajshahi have been categorized as aquatic, terrestrial, epiphytic and lithophytes.

Kifayat *et al.*, (2022) documented Ethnomedicinal uses of the Ferns of Shishikoh Valley, Chitral, Pakistan. A total of 18 taxa were recorded that belonged to 9 genera and 6 families being used in the treatment of different ailments.. The reported ferns taxa were used as anthelmintic, anti-rheumatic, astringent and wound healing agents and in the treatment of different ailments such as asthma, bronchitis, diarrhea, dysentery, gonorrhoea, hepatitis, infertility, influenza, kidney disorders, measles, oral ulcer, oral thrush, pneumonia, pyelonephritis, pharyngitis, scorpion bite, sinusitis, tonsillitis and tuberculosis.

Irfan *et al.*, (2021) documented the floristic diversity, chorotype analysis and occurrence of pteridophytes in Pakistan. 168 taxa belonging to 45 genera and 19 families were recorded from the study area. Pteridaceae and Dryopteridaceae were the largest families with 35 taxa each.

Humaira *et al.*, (2020) documented the floristic attributes of the pteridophytes of district Tor Ghar; Khyber Pakhtunkhwa, Pakistan. Total 41 species distributed in 20 genera and 10 families were recognized. Dryopteridaceae was the largest family with 12 species (29.26%). Second and third large family is Pteridaceae and Thelypteridaceae with 10 (24.39%) and 5 (12.19%) species respectively.

Hira Shova Shrestha and Sangeeta Rajbhandary (2019) conducted Floristic Study of Fern and Fern Allies Along Altitudinal Gradient from Besishahar to Lower Manang, Central Nepal. A total number of 99 species of pteridophytes belonging to 20 families and 48 genera are recorded. Among 20 families Pteridaceae was the largest family having 11 genera while Thelypteris is the largest genera occupying nine species.

Ranil *et al.*,(2015), studied the under- exploited opportunity of ornamental pteridophytes in the Sri Lankan Floriculture industry. The study states that public awareness programmes should be initiated based on sustainable utilization of ferns and conservation and also promoting in - situ and ex-situ conservation and domestication. This will bring new directions for the Sri Lankan Floriculture industry and solve the conservation issues of threatened and endangered pteridophytes species in Srilanka.

Santos *et al.*,(2010) conducted phytochemical investigations in pteridophytes growing in Brazil. They found 78 phytochemical studies carried out on 60 species and two varieties.

Mateus Luí's Barradas Paciencia, and Jefferson Prado(2005)were investigate the impacts of forest fragmentation on the pteridophyte communities of Una region of Bahia, Brazil, by comparing species richness and ensemble diversity among areas of large forest fragments .

WORKS ON PTERIDOPHYTA OF INDIA

Moorthy.D and Aravindhan.V(2022) studied the diversity of medicinal plants in Shevaroy hills of Eastern Ghats.This Provided. a comprehensive data of the ethnomedicinal uses of some ferns from Shevaroy Hills of Tamil Nadu. Based on these data, the documented therapeutic potential of ferns is analysed to highlight the gaps in their knowledge that deserve further investigation and can also be used as a starting point in the development of new drugs.

Priti Giri and Prem.L Uniyal(2022) studied the edible ferns in India and their medicinal uses. It provided an outline of edible ferns and fern allies of traditional food uses in the tribal communities of India that can be exploited for consumption in other regions of India.

Kishore *et al.*,(2021) prepared a check- list of pteridophyte of Gujarat state. They documented species diversity and to update the checklist of pteridophytes occurring in Gujarat state. A total of 50 naturally occurring species or subspecies representing 23 genera in 14 families were collected from different regions of the state. An additional 13 species cultivated in the University Botanical Garden or in homes and gardens have also been noted.

Suresh *et al.*,(2020) studied the Ethnomedicinal uses, phytoconstituents and pharmacological importance of pteridophytes used by *Malayalis* in Kolli hills, India.This study documented the medicinal usage of pteridophytesby *Malayali* people in Kolli hills of Eastern Ghats, India. Existing information on phytoconstituents, previous reports on similar therapeutic uses and pharmacological activities for the documented species were compiled.

A.K Soni and V.K Rawat (2020) discovered a new sub species record for pteridophytic flora of Arunachal Pradesh. They collected *Hypodematium crenatum* (Forssk.)Kuhn subsp.crenatum., a rare species of FamilyDryopteridaceae,from Hakhe Tari Primary Forest, Ziro Valley (Lower Subhansiri District) of Arunachal Pradesh state and is reported as a new subspecies distributional record for Arunachal Pradesh.

Behera *et al.*,(2019) discovered a new species of fern called *Christella kendujharensis* (Thelypteridaceae) from Odisha .It shows morphological resemblance with *Christella clarkei* (Bedd.) C.F.

Ronak *et al.*, (2015) documented the pteridophytes in Gujarat. Extensive field work in hilly regions, plain lands, wet lands, agricultural fields and arid regions of the Gujarat state was carried out in all 33 districts in 2013-14. From the total collection, five species differed from the earlier reported species.

Deepa *et al.*, (2010) enumerated the pteridophytes in Madhuguni forest, Central Western Ghats, Karnataka, South India. This preliminary enumeration lists 23 pteridophyte species. The majority of the ferns here are terrestrial except two epiphytes, one scandent and one aquatic fern.

Malay Bharti and Ram Pravesh(2010) studied the diversity, distribution and conservation priorities for pteridophytic flora of Ranchi and Lateher district of Jharkhand,India. In this study about 27 species of pteridophytes and their distribution in Ranchi and Latehar districts have been recorded. The effect of altitudinal variation in distribution of genera and species is evident by absence of species on increasing altitude and appearance of new members.

Shil S. and Chaudhury M.D (2009) studied the ethnomedicinal importance of Pteridophytic floras used by the Reang tribes of Tripura state, India. As many as 16 pteridophytic plants species belonging to 14 genera and 10 families were discussed here.

Sukumaran *et al.*,(2009) studied the diversity of pteridophytes in the miniature sacred forests of kanyakumari district, Southern western ghats. 24 species of pteridophytes were inventoried from Vilavancode, Kalkulam and Thovalai sacred groves of Kanyakumari.

Subhash *et al.* ,(2008) assessed the rare and threatened Pteridophytes of political India. They classified species into different categories, based on their own field-observations, data from herbarium-collections, and published literature. Modern taxonomic concepts and nomenclature have been adopted. Their survey has revealed that 414 species of Pteridophytes (219 At risk ,of

which 160 Critically endangered, 82 Near-threatened and 113 Rare), constituting 41-43 % of the total number of 950-1000 Pteridophytes of political India, are threatened or rare there.

Punetha *et al.*, (2004) studied the pteridophytic diversity of Kumaon, Uttarakhand. They found that about 304 species of Pteridophytes (Table 1) are seen in Kumaon, which is one of the richest floristic regions of India.

Manickam and Irudayaraj (1992) studied the pteridophytes of Western ghats.

Beddome, a British botanist, published his outstanding works as ferns of south India (1863), Ferns of British India (1865), Supplements to ferns of South India and British India (1876), and Handbook of ferns of British India, Ceylon and Malay Peninsula (1883).

Himalayan fern flora was first studied by Don (1825).

Burman (1768) described about 12 genera of ferns from India.

WORKS ON PTERIDOPHYTA OF KERALA

Amnu Shaji and S. Amala Divya (2022) cryptogam diversity and economic utility of Nilambur, Malappuram, Kerala. The present study resulted in recording of 22 species of Pteridophytes belonging to 14 families from Nilambur. Plants were collected from 35 sites of the study area. Selaginellaceae, Pteridaceae and Thelypteridaceae are the common families in this area. Selaginellaceae consist of 3 species. Pteridaceae are with 5 species and Thelypteridaceae with 2 species. Selaginella, Pteris and Christella are the dominant genera of the area.

Arjun *et al.*, (2021) studied the diversity of pteridophyte of Rajamala, at Eravikulam National Park. They found 54 species of pteridophyte including fern and fern allies belonging to 16 different families from this region. Among this Aspleniaceae was the most common family with eleven species followed by Polypodiaceae.

Archana & Gayathri (2021) carried out studies to analyze the distribution of flora present in the two main sacred ponds namely Chirakkal chira and Rjarajeshwara chira of Kannur district, Kerala. A total of twenty seven genera of algae, ten genera of fungi, four pteridophytes and twenty angiosperms were recorded.

Lubaina *et al.*, (2019), studied the pteridophytic diversity at the Neyyattinkara municipality, Thiruvananthapuram, Kerala. That resulted in the documentation of 37 species of ferns and lycophytes under 26 genera belonging to 16 families.

Praveen Kumar and Udayan(2018), conducted a survey on the pteridophyte flora of the 18 selected sacred groves in Chalavara grama panchayath, Palakkad district, Kerala leading to the collection of 26 species of pteridophytes coming under 20 genera and 14 families.

Rekha and Athira(2017), studied the diversity of 24 species of pteridophyte flora in Akamala forest station, Thrissur, Kerala. The collected species belong to 17 genera, 14 families and 2 classes. Most of the collected species were terrestrial. A few numbers of epiphytes, lithophytes and aquatic species were also reported. The study area was rich in pteridophyte diversity.

Resmi *et al.*, (2016), studied the anatomical features of selected three species of *Adiantum L.* from Kerala. The studied species were *Adiantum caudatum L.*, *Adiantum latifolium Lam.* and *Adiantum lunulatum Burm.* The study determined the position and structure of vascular components of mature fern and also the indications of phylogenetic relationships.

Vijisha & Rajesh (2016), studied a total of 69 species of pteridophytes including 63 ferns and 6 lycophytes from the Aralam sanctuary in the Western Ghats of Kerala. They reported some of the rare and endemic species including the members of Hymenophyllaceae, the most sensitive fern family.

Joseph and Thomas(2015), studied 15 species of Chasmophytic pteridophytes belonging to 11 families and 11 genera that were distributed in the rocky cliffs and crevices Urumbikkara hills of Idukki district, Kerala. They also emphasized certain medicinal and ornamental potentialities of plants.

Kishore Kumar (2015), studied the diversity floristics, ethnobotanical and ecological aspects of about 674 taxa of vascular plants in Anamudi Shola National Park, Munnar, Idukki district, Kerala which include 76 species of pteridophytes. Pteridophytes belonged to 46 genera under 24 families. Among the 76 pteridophytes, terrestrial taxa constituted 55%. The 76 pteridophytes collected from the park form 23% of the total pteridophyte flora of the state.

Neha Bjpai (2013) conducted a comparative study of strobilus of *Selaginella tenera* at Pokkod lake, Wyanad. This effort helps to identify the gaps and lacunas in the studies of reproductive biology and spore morphology.

Sumesh *et al.*,(2012) studied the conservation strategies for the Hygrophilous Pteridophytes of Central Western Ghats. Their study in central Western Ghats indicates that if humid microhabitats such as Myristica swamps, dipterocarp dominated relic primary forests, perennial waterfalls,

sholas etc., most sought after for hydro-electric projects, expansion of coffee and tea plantations, betelnut gardens etc. are prioritized for conservation.

Raju Antony and Mohanan. N (2010) discovered *Polystichum manickamianum* BenniaminFraser-Jenkins & Irudayaraj hitherto known only from TamilNadu for the first time from Kerala. Detailed description, photographs and relevant notes are provided for their easy identification.

Sujanapal. P and Sasidharan. N (2009) studied the diversity and ethnobotanical uses of pteridophytes in Parambikulam Wildlife Sanctuary, Kerala, South India. The studies resulted in the documentation of 81 taxa of pteridophytes including seven endangered taxa. Ethnobotanical information of 17 taxa of pteridophytes were also recorded, which include three edible ferns.

Santhosh Nampy and P.V Madhusoodanan (1998) studied the morphology and taxonomy of Polypodioid Ferns and Fern-allies of Wayanad district, Kerala.

MATERIALS AND METHODS

STUDY AREA

The study was carried out to assess and analyze the pteridophytes flora of Thazhava Gram Panchayat, under Ochira block in Karunagappally thaluk of Kollam district in Kerala, India. Thazhava panchayat lies between 9⁰ 5' 47" N and 76⁰ 33' 11" E. The total area of the panchayat is 11.94 sq.km and is divided into 22 ward divisions. The soil is sandy type.(Fig 1).

1. COLLECTION OF PLANT MATERIALS

Systematic collection of the Ferns and Lycophytes done during the field study. Data on the habit, habitat, location co-ordinates and other ecological details were noted. The plants and their relevant parts were photographed. The specimens for the taxonomic were collected.

2. TAXONOMIC STUDIES

The collected specimens were critically studied and identified with the help of authentic taxonomic literatures such as The Ferns of Southern India (Beddome, 1864); Pteridophyte Flora of the Western Ghats, South India (Manickam & Irudayaraj, 1992); Ferns and Lycophytes of Peechi-Vazhani Wildlife Sanctuary in Kerala, India (Sreenivas V K 2021) and consultation with the experts in the field. Detailed descriptions, citations, key to the taxa, distribution maps, IUCN status etc. were prepared. Detailed illustrations and photo plates were prepared for the easy identification of taxa.

3. HERBARIUM PREPARATION

The specimens of appropriate size with relevant parts were collected from the field and sealed in polyethylene covers after treating with formaldehyde. Herbaria were prepared following wet method (De Vogel, 1987; Forman & Bridson, 1998). The dried specimens were mounted on standard handmade sheets (28 × 42 cm) and labeled properly with standard labels (14.5 × 11 cm), after including all the relevant information. The specimens will be poisoned with mercuric chloride and will be deposited in College Herbaria.

4. CONSERVATION

Collected species from the study area were introduced to the Green House of the College.

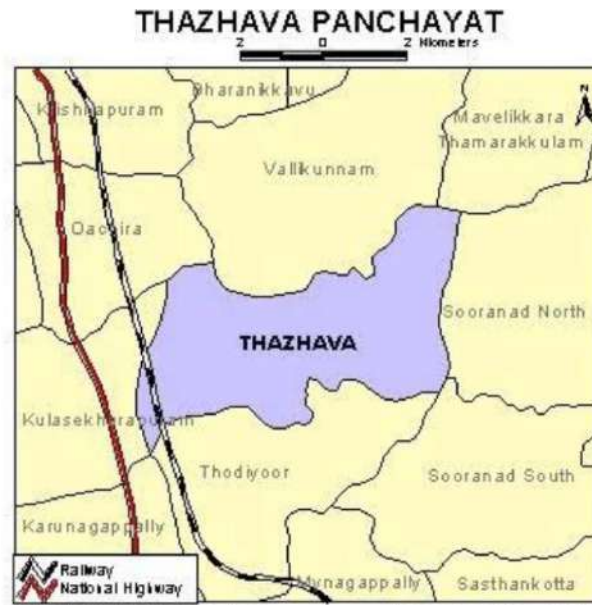


Fig.1 Thazhava Gram Panchayat

RESULTS AND DISCUSSION

The present study could report a total of 26 pteridophytes. These identified plants are listed below along with their taxonomic descriptions and ecology. The data is represented and arranged according to the recent PPG 1 classification.

TAXONOMIC TREATMENT

Key to the family in Thazhava Gram Panchayath

1. Leaves single veined, rhizophore present.....Selaginellaceae
1. Leaves multiple veined, rhizophore absent.....2
2. Plants climbing.....3
2. Plants not climbing.....4
3. Fronds dimorphic, sori achrostichoid.....Blechnaceae
3. Frond monomorphic, sori in spike.....Lygodiaceae
4. Ferns aquatic.....5
4. Ferns terrestrial(except Ceratopteris).....6
5. Leaves floatingSalviniaceae
5. Leaves floating when young, erect when mature.....Marsileaceae
6. Pinnae sessile, base auricled.....Nephrolepidaceae
6. Pinnae petiolate or short stalked, not auricled.....7
7. Sori, linear, marginal to submarginal.....Lindsaeaceae
7. Sori otherwise.....Pteridaceae
8. Indusium usually present.....Thelypteridaceae
8. Indusium absent.....Polypodiaceae

SELAGINELLACEAE

SELAGINELLA P.Beauv.

Terrestrial herbs and epiphytes (*S.vaginata*), erect or creeping, stem delicate, stipe pale green. Leaves arranged in four rows, sessile; Strobilus terminal to each branch, heterosporous, microspores numerous and megaspores four per sporangium. Rhizophores branched, leafless, colourless, present on the stem.

Key to the species

1.Plant small,prostrate,spike dorsiventral.....*S.ciliaris*

1.Plant erect,spike quadrangular.....*S.delicatula*

Selaginella delicatula (Desv.ex.Poir) Alston

Plant Size 20×9cm, rhizophores 8cm long, cylindrical, brittle, stipe 15 cm long 3mm thick; Leaves simple, dimorphic except in the strobili, Lateral leaves 2.3×3 mm, ovate, sessile, green, margin entire; median leaves 2×1mm, sessile, membranous, ovate, apex acuminate, margin entire. Strobilus 2×0.3 cm, quadrangular. Sporophyll monomorphic, spirally and closely arranged towards the base. Microspores numerous and megaspores four per sporangium. (Plate 1, fig 1a-1d)

Ecology -Terrestrial herbs

Current status - Least Concern

Selaginella ciliaris (Retz.) Spring

Stem 2-5 cm, short-creeping, fertile stem erect. Rhizophore restricted to the lower branches or to middle of main stem, stem branched, branches simple to compound from base, 0.2-0.4 mm thick. Stem terete, primary leafy branches 3 or 4 pairs, simple or forked, or once pinnately branched; axillary leaves 1-2 ×1mm, base exauriculate, margin ciliolate at base, apex slightly acute; ventral leaves ovate or ovate-lanceolate 1.4 -2 ×2 mm, acroscopic base enlarged, broader, margin ciliolate; dorsal leaves 1.5×1mm, base sub cordate, margin minutely denticulate, apex acuminate; strobili, solitary, terminal, compact, 4.5×2 mm; sporophylls dimorphic, ventral sporophyll ovate to triangular, margin ciliolate, dorsal sporophyll ovate-oblong, ciliolate. (Plate 1. fig 2a-2d)

Ecology –Terrestrial lithophytes or along exposed earth cuttings

Current Status-Least Concern

LYGODIACEAE

LYGODIUM Sw.

Climbing fern, rachis slender, flexible; lamina tripinnate or tripinnatifid, segmented, apex acute, acuminate or rounded. Sori born as finger like spikes along the margin, covered by hairy indusium.

Key to the species

1. Pinnules large, oblong or lanceolate, lobed.....*L. flexuosum*

1. Pinnules small, oblong to triangular, usually unlobed.....*L. microphyllum*

Lygodium flexuosum (L.) Sw.

Climbing ferns; Rhizome creeping 2.5mm thick, cylindrical; frond tripinnate, 40 cm wide, Stipe stramineous, 3mm thick, abaxially rounded, adaxially flattened. Primary pinnae size 18×13 cm, ovate. Secondary pinnae four pairs, alternate, petiolate, sessile towards the apex. Pinnules oblong or lanceolate, apex round or acuminate, base usually attenuate. Pinnae segmented at the region of sori. Sori 3×2mm, dark green, arranged as spikes along the margin, almost 10-12 sporangia in cluster, covered by light green coloured indusium. (Plate 1, fig 3a-3d)

Ecology -Terrestrial climbers.

Current status -Least Concern

Lygodium microphyllum (Cav.) R.Br.

Rhizome wiry, dark brown; fronds climbing, several meters long, pinnately compound; stalk above petiole, wiry, stem like; pinnae in pairs, oblong to triangular, glabrous, margin entire, apex pointed, 1.5-3×1 cm; fertile lamina slightly lobed; lobes bearing sporangia narrow, protruding along the margin, 1mm thick. (Plate 1 fig 4a-4d)

Ecology-Terrestrial climbers on plants

Current status – Least Concern

SALVINIACEAE

SALVINIA Seg.

Stem creeping, branched, hairy; lamina, trimerous, whorled, with 2 leaves green, oblong, sessile or short petioled, flat, entire and floating, and one leaf finely dissected, petiolate, root like and pendent; submerged leaves bears sori; sori surrounded by basifixed membranous indusial (sporocarp). Sporocarp 2 types, megasporangia and microsporangia. Megasporangia few in number; microsporangia numerous.

Salvinia molesta D.Mitch.

Stem creeping, branched, hairy, rootless, 7-10 cm long; lamina, trimerous, whorled, with 2 leaves, light to median green with brownish edges, round or oblong, opposite, sessile or short petioled papillate, flat, entire, floating floating and one leaf root like, submerged, stalked, feathery ,bears clusters of sporocarp. Floating leaves aggregate into mats, folded and compressed into upright chains; sporangia in sporocarp; sporocarp rounded, stalked, submerged. (**Plate 2, fig 1a-1d**)

Ecology - Free floating aquatic fern, grows in slow moving such as in ditches, ponds, lakes etc.

Current Status - Included in Invasive Species Specialist Group.

MARSILELACEAE

MARSILEA L.

Rhizome long, creeping, cylindrical, dark green or light brown; roots arising at nodes; lamina palmately divided into 4 pinnae; pinnae 2×2 cm, cuneate or obdeltate, pulvinate at base, frequently with numerous red or brown streaks abaxially in floating leaves; stipe 15-25 ×0.2 cm ,filiform, stiffy erect or procumbent in land leaves. Sporocarp born on branched or unbranched stalks, at or near bases of petiole, above ground, attached laterally to stalk apex, short stalked, densely to sparesly hairy, usully bean shaped.

Marsilea minuta L.

Rhizome long, creeping, green to brown, cylindrical, roots on nodes 1.8 mm thick; fronds simple, 15×4 cm, green; lamina palmately divided into 4 pinnae; pinnae, cuneate, 2×2 cm, glabrous; petiole long, 13×0.2 cm, cylindrical, green; sporocarp 2.5-4 ×2.4 -3 mm, upto 4, each at peduncles

near the base of the petiole, bean shaped, densely covered with scales, raphe 1-2 mm long. (Plate 2, fig 2a-2d)

Ecology - Aquatic herbs.

Current Status – Least Concern.

LINDSAEACEAE

LINDSAEA Dryand.ex Sm.

Rhizome creeping, scaly; fronds herbaceous or subcoriaceous, simply pinnate or bi-tri-pinnate; pinnae sometimes articulate, dimidiate or equal sides, fertile only on the upper margin or on both margin; veins forked, veinlets straight, combined at apices by the receptacle, otherwise free. Sori indusiate, linear or oblong, continuous or interrupted; indusium shorter than the margin of the frond, opening on the exterior side.

Lindsaea ensifolia Sw.

Rhizome long, creeping, 2mm thick, scaly; scales 1×0.2 mm, linear, entire, acuminate, dark brown, uniformly thickened; 30×10-15 cm, simply pinnate; pinnae 10-12×0.7×1 cm, oblong - acuminate, subsessile, obliquely cuneate at base, serrate at distal non soral part, alternate, except the basal pinnae; veins anastomosing, costa prominently raised beneath; stipe 15-20 ×0.2 cm, dark brown to pink, polished. Sori linear, 7 -10 cm long, yellowish brown, indusiate. (Plate 2, fig 3a-3d).

Ecology -Terrestrial herbs on the banks of streams of shady places.

Current Status – Least Concern.

PTERIDACEAE

Key to the Genera

- 1.Plant dimorphic.....2
- 1.Plant isomorphic.....3
- 2.Aquatic.....*Ceratopteris*
- 2.Terrestrial.....*Parahemionitis*
- 3.Lamina tripinnate.....*Cheilanthes*

3.Lamina bipinnate.....*Pityrogramma*

4.Indusia true..... *Adiantum*

4.Indusia false.....*Pteris*

ADIANTUM L.

Plant about 20-50 cm long, rhizome creeping or suberect, frond simple or bipinnate, lamina ovate or lanceolate, pinnae green (some species may have a brown shade also), fan shaped and subsessile; venation is dichotomous; sori marginal and acroscopic with true indusia.

Key to the Species

1.Fronds simply pinnate.....2

1.Fronds bipinnate, rhizome long creeping.....*A.latifolium*

2.Pinnae sessile or subsessile*A.caudatum*(stipe dark brown)

2.Pinnae long petiolated.....*A.philippense* (Stipe black)

***Adiantum caudatum* L.**

Rhizome erect, 1cm thick, scaly. Scales brown, lanceolate, apex acuminate, margin entire. Fronds scattered on rhizome,40×3cm, lanceolate. Stipe 8×0.2cm, terete, dark brown. Lamina 32×3cm, linear or lanceolate, simply pinnate, pinnae 32 pairs, alternate, sessile or sub sessile, basal pairs slightly reduced, pinnae fan shaped.Veins free, dichotomously branched, reaching to the branch. Sori 4-6 per sporophyll, marginal, covered by true indusia. (Plate 2, fig 4a-4d)

Ecology -Terrestrial herbs seen in fully exposed dry places.

Current status - Least Concern

***Adiantum latifolium* Lam.**

Rhizome long creeping 2.5 mm thick, cylindrical, scales all over. Scales light brown, lanceolate, apex acuminate, margin sparsely ciliate. Frond 45×20 cm, bipinnate, upper dark green lower black, ovate. Stipe 20×0.3 cm, black or dark brown, not grooved, glossy. Lamina 20×20 cm wide, widely ovate hairs present allover the rachis. Primary pinnae 11×5 cm, ovate or lanceolate, alternate, margin serrulate when young and lobed when matured, apex acute, base cuneate; venation dichotomous, veins free, forked and reaches the margin Sori 12-15 per pinnule, crescent shaped, covered by membranous indusia. (Plate 3, fig 1a-1d).

Ecology -Terrestrial herbs along fully exposed banks of ponds, streams etc.

Current status – Least Concern.

***Adiantum philippense* L.**

Plant 20×4 cm, lanceolate, stipe dark brown or black, 10×0.1cm, terete, glossy scaly, scales 2×0.3mm, brown, lanceolate, apex acuminate; rhizome erect or suberect, scaly; frond acuminate, margin entire; lamina 10×4 cm, simply pinnate, lanceolate, pinnae 10-15 pairs, 3×1cm, fan shaped, alternate petiolate. Venation dichotomous, veins free, forked and reaches to the margin. Sori 6-8 per sporophyll, crescent, marginal, covered by pale brown membranous indusia. (Plate 3, fig 2a-2d)

Ecology -Terrestrial herbs on fully exposed roadsides.

Current status – Least Concern

CERATOPTERIS Brongn.

Aquatic, herbs, dimorphic, height about 60 cm, rhizome fleshy light brown or pale green, fertile frond longer than sterile frond, fertile pinnae reduced to needle like structure, margin curved downwardly, sporangia arranged in two rows, sporangia rounded and sessile.

***Ceratopteris thalictroides* (L.)Brongn.**

Aquatic herbs, rhizome erect or suberect, fleshy, light brown; frond scattered on the rhizome, dimorphic; sterile frond 50×20 cm, stipe 20×1cm, pale green, fleshy, sparsely scaly, parallel ridges present. Lamina bipinnate or tripinnate, 30×20 cm, ovate, primary pinnae 5 pairs, 10×5 cm, ovate, alternate, sessile, apex acuminate, margin entire, costa flattened above, ridged below. Fertile frond longer than sterile frond 70×30 cm, stipe 20×1 cm, fleshy, ridged, lamina tripinnate, 50×20 cm, pinnae 6×0.1 cm, needle like, linear, apex acute, margin entire; margin curved downwardly in which sporangia arranged in two rows; sori linear along the margin.(Plate 3, fig 3a-3d).

Ecology - Aquatic herbs commonly seen in paddy fields, ponds and marshy areas.

Current status – Least Concern.

CHEILANTHES Sw.

Herbs, height upto 45cm, rhizome short, creeping, stipe reddish brown or black, glossy, lamina tripinnate, oblong or ellipsoid, apex acute or rounded, margin entire or lobed, veins forked once, Sori submarginal.

***Cheilanthes tenuifolia* (Burm.f.)Sw.**

Plant about 35-40 cm long; rhizome short, creeping, cylindrical, densely scaly at the apex, scales 2×0.1 mm, brown, lanceolate, apex acuminate, margin entire; frond 38×13cm; stipe 24×0.1 cm, terete, reddish brown or black; lamina tripinnate, 14×13 cm, ovate, primary pinnae 4-6 pairs 6×4 cm, ovate, alternate and petiolate, secondary pinnae 4-6 pairs 2.5×1 cm, ovate, short stalked and lobed, pinnules 4 pairs, 6×4 mm, oblong or ellipsoid, apex acute or rounded, base cuneate, margin entire or lobed costa rounded below and grooved above veins forked once and free; sori 5-8 per pinnule, irregular, and submarginal. Indusia absent. (Plate 3, fig 4a-4d)

Ecology -Terrestrial herbs on fully exposed earth cuttings.

Current status – Least Concern.

PARAHEMIONITIS Panigrahi

Herbs, rhizome erect or suberect, dimorphic, fertile frond longer than sterile frond; lamina simple and green, ovate in sterile frond and deltoid in fertile frond, apex acute or rounded, base cordate, veins arranged as network, anastomosing, numerous aroles, sori acrostichoid on abaxial side, arranged in network manner.

***Parahemionitis arifolia* (Burm.f.) Panigrahi**

Herbs, rhizome suberect, 2×0.5 cm, scales at apex, 3×0.4 mm, lanceolate, apex acuminate, margin entire, dark brown at centre, whitish at periphery; fronds scattered on rhizome, dimorphic and simply pinnate, fertile frond longer than sterile frond; sterile frond 15-20×5 cm, stipe 10×0.1 cm, dark brown or black, glossy, terete, brittle. Sterile lamina 10×5 cm, dark green, petiolate, ovate, apex acute or rounded, base cordate, margin entire, costa grooved above ridged below, flattened towards apex, veins arranged as network. Fertile frond 25-30×6 cm, stipe 20-25×0.2 cm, lamina trilobed, apex acute or acuminate. Sori reddish brown acrostichoid on abaxial side arranged in network manner. (Plate 4, fig 1a-1d)

Ecology -Terrestrial herbs on fully exposed places.

Current status – Least Concern.

PITYROGRAMMA Link.

Height about 35-40 cm, rhizome suberect, stipe black or reddish brown, glossy, lamina bipinnate or bipinnatifid, ovate or lanceolate ultimate segments oblong or lanceolate, adnate to the costa, sori arranged on either side of the costa.

***Pityrogramma calomelanos* (L.) Link**

Rhizome 2×1 cm, suberect, scales at the apex, 2×0.1 mm, lanceolate, brown, apex acuminate, margin entire, fronds scattered, 40×10 cm, stipe 15×0.3 cm, dark brown or reddish brown, glossy adaxially grooved, abaxially rounded. Lamina bipinnate, 25×10 cm, green, ovate, adaxial side glossy, abaxial side covered by waxy powder. Pinnae 15-20 pairs, size 5×1 cm, alternate, lanceolate, short stalked, sessile towards apex, each contains 10-13 pairs of pinnules, pinnules 1×0.6 cm, oblong, margin serrate, apex acute, adnate to costa, venation dichotomous, sori linearly arranged on either side of costa, indusia absent. (Plate 4, fig 2a-2d)

Ecology – Terrestrial herbs along dry and fully exposed roadsides.

Current status - Least Concern.

PTERIS L.

Height 15-300 cm. Rhizome erect to suberect, creeping, stipe 6-165 cm long, usually green or chestnut brown, lamina pinnate, bipinnate or tripinnate, ovate, deltoid or lanceolate, herbaceous, pinnae 2-22 pairs, pinnules 7-55 pairs, apex entire, sometimes serrate, sinus near to costa, veins 6 pairs to numerous, forking, sori submarginal except at apex and base, false indusium, spores brown.

Key to the Species

- 1. Setae long along the costa.....*P.praetermissa*
- 1. Setae absent.....2
- 2. Sinus below 1mm from costa.....*P.perrottetii*
- 2. Sinus above 1mm from costa.....*P.confusa*

***Pteris confusa* T.G.Walker**

Rhizome suberect, 2×1 cm, scales densely at the apex, 4×0.3 mm, dark brown, lanceolate, apex long acuminate, dark brown at centre, pale brown and transparent at periphery, margin ciliate; Fronds scattered 80×25 cm; stipe 40×0.5 cm, adaxially grooved, abaxially rounded, dark brown at

base, stramineous when dry; Lamina bipinnate, 40×25 cm, glabrous, green and ovate; pinnae 15×3 cm, 8 pairs, sub opposite to alternate, lanceolate, margin pinnatifid, basal pair of pinnae branched; pinnules 16-18 pairs, apex rounded, margin entire; sinus 2-3 mm away from costa; venation dichotomous, veins free, forked once at base and reaches to the margin; sori linear, 10×1mm, submarginal, sporangia covered by false indusia. (Plate 4, fig 3a-3d)

Ecology -Terrestrial herbs along stream banks and roadsides.

Current status -Least Concern.

Pteris perrottetii Heiron.

Rhizome suberect, 1.8 cm thick, scales densely at the base, 6×0.4mm, dark brown, lanceolate, apex acuminate; fronds scattered, 100×32 cm; stipe 40×0.6 cm, dark brown at base, green towards apex, adaxially grooved, abaxially rounded, scales at base; lamina bipinnate, 60×32 cm, green, ovate or lanceolate; pinnae 10-12 pairs, largest pinnae 20×5cm, opposite to sub opposite, sessile or subsessile, lanceolate, margin pinnatifid, apex acuminate, base cuneate, terminal pinnae 18×4 cm, short stalked; pinnule 3×0.4 cm, oblong, apex rounded, margin entire, sinus upto costa, venation dichotomous, veins forked once, free and reaches to the margin. Sori linear, 3×1mm, submarginal on either side of the pinnule, sporangia covered by false indusia. (Plate 4, fig 4a-4d).

Ecology -Terrestrial herbs on partially exposed floors.

Current status -Endemic to south India.

Pteris praetermissa T.G.Walker

Rhizome 2×1.5 cm, suberect, scales densely at the apex, 2.5×0.6 mm, lanceolate, apex acuminate, margin entire; Fronds scattered, 80×30cm ; stipe 30×0.3cm, terete, adaxially grooved, abaxially rounded, scales at base, scales 4×0.3mm, dark brown, lanceolate. Lamina bipinnate, 50×30 cm, ovate, pinnae 15×3 cm, 6-12 pairs, lanceolate, apex acuminate, base cuneate, margin pinnatifid, basal pair short stalked, branched once and opposite; pinnules 1.8×0.4cm, 18-23 pairs, oblong, apex rounded, margin entire, setae present along the adaxial side of costule, costa slightly raised and grooved above, ridged below, venation dichotomous, veins free, forked once and reaches to the margin. Sori linear, 10×1 mm, submarginal on either sides of pinnule, covered by false indusia. (Plate 5, fig 1a-1d)

Ecology -Terrestrial herbs along stream banks and floors.

Current status - Least concern.

BLECHNACEAE

STENOCHLAENA J.Sm.

Climber, rhizome stramineous, can climb to the top of large trees. Roots grouped at regular intervals. Frond dimorphic, pinnae lanceolate in sterile lamina and linear in fertile lamina. Margins of fertile pinna reflected and those of sterile pinna serrated. Sori acrostichoid.

Stenochlaena palustris (Burm.f) Bedd.

Their rhizome long and creeping. It can climb to the top of large trees. The rhizome 0.6cm thick, root form tufts on its abaxial side at regular intervals. The growing part of rhizome is covered with scales. Scales size 1×1mm, ovate, dark brown at centre and light brown at periphery. Frond dimorphic, sterile frond size 70×30 cm, oblong, stipe size 25×0.4cm, stramineous, cylindrical, and green. The fertile frond is oblong. Lamina simply pinnate, 45×30 cm, pinnae 12-15 pairs, alternate, short stalked 18×2.5 cm. Veins free and dichotomous. Sterile pinnae lanceolate, margin serrated. Fertile pinnae linear and margin reflexed. Costa slightly grooved adaxially. Sori acrostichoid on the abaxial side of fertile pinnae. (Plate 5, fig 2a-2d)

Ecology - Climbers on large trees.

Current status – Least Concern

THELYPTERIDACEAE

Key to Genera

- 1. Sori arranged in pairs.....*Christella*
- 1. Sori not in pairs, forming zig zag pattern.....*Cyclosorus*

CYCLOSORUS Link.

Rhizome long, creeping, with ovate and scattered scales; fronds isomorphic; stipe yellow-brown, adaxially grooved, abaxially rounded; lamina size 40×20 cm, simply pinnate, usually elliptical or

ovate, dark green; pinnae with prominent midrib, lanceolate, short petiolate. Sori round, forming a zig zag pattern along each side of the costa and indusiate.

***Cyclosorus interruptus* (Willd.)H.Ito**

Rhizome creeping, upto a 5mm diameter, with sparse scales; scales ovate; frond size 70×20 cm, erect, lethery; stipe upto size 30×0.5 cm, yellowish green at top and pale brown towards the base Lamina 40×20 cm, ovate -lanceolate in outline and pinnatifid. Pinnae 10×1.5cm, lanceolate short petiolate and lobed. Rachis pale brown, hairless. Sori round, upto 18 per lobe, forming a zigzag pattern along each side of the costa and indusiate. (Plate 5, fig 3a-3d).

Ecology -Terrestrial herbs on shady places

Current Status -Least Concern.

CHRISTELLA H.Lev.

Height about 50-120cm, rhizome creeping, cylindrical, stipe almost dark brown, lamina lanceolate, with much reduced stalk, base cuneate, apex acuminate, segments oblong, 20-25 per pinnae, sori submarginal, 1mm in diameter, protected by reniform or circular indicia.

Key to the species

1.Basal pair of pinnae reduced,not equal in size.....*C.dentata*

1.Basal pair of pinnae not much reduced.....*C.parasitica*

***Christella dentata* (Forssk.) Brownsey &Jeremy**

Rhizome short, creeping, 5mm thick.; apex acuminate, covered with dark brown scales; scales 3mm long, lanceolate, base cordate, margin entire; fronds 90 cm long,ovate to lanceolate, stipe, green, size 36×0.3cm, adaxially grooved, abaxially rounded, scales at base, scales 2.5×0.4mm, lanceolate and brown. Lamina bipinnate, 56×25cm, green, ovate or lanceolate; pinnae 14 to 17 pairs, basal 4 to 8 pairs of pinnae reduced, alternate, lanceolate. Terminal pinnae trullate, pinnules 22 to 26 pairs, 1.4 ×0.3 cm, ovate, apex acute. Veins simple, free and 7 pairs. Sori nearly 6 pairs per pinnule,1mm diameter. Sporangia covered with light brown colour indusia.

Ecology -Terrestrial herb along the banks of streams and ponds. (Plate 5 fig 4a-4d).

Current status – Least Concern

***Christella parasitica* (L.) H.Lev.**

Plant size 75×25 cm, rhizome short creeping or erect, 0.5 cm thick, scales densely at the apex. Scales 2×0.5 mm, brown, lanceolate and margin entire. Fronds upper green, lower brown, ovate to lanceolate. Stipe size 20×2cm. Basal pairs opposite and not reduced, alternate towards the apex, lanceolate, apex acuminate. Basal acroscopic pinnules larger than others. Pinnules more than 20 pairs and margin entire. Veins simple, free and veinlets 7 pairs. Sori 1mm in diameter. Each sides of the costule consist of 25 to 35 sporangia. They are covered with dark brown coloured membranous indusia. (Plate 6, fig 1a-1d).

Ecology-Terrestrial herbs on shaded places.

Current status – Least Concern

NEPHROLEPIDACEAE

NEPHROLEPIS Schott

Herbs, rhizome erect or suberect with creeping roots, scaly; frond upto 45-65 cm, stipe pale green, lamina simply pinnate, ovate to lanceolate, pinnae reduced at the base, sessile, base overlapping the rachis and adjacent pinna, margin crenate or rarely serrate,veins simple; sori submarginal, reniform, indusiate.

Key to the species

- 1.Pinnae base overlapping the rachis and adjacent pinna.....*N.cordifolia*
- 1.Pinnae usually base not overlapping..... *N.hirsutula*

***Nephrolepis cordifolia* (L.) C.Presl**

Rhizome erect or sub erect, 2cm thick, cylindrical, scaly; scales, 3×0.5 mm, pale brown, lanceolate, apex acuminate, margin fimbriate; fronds 40×6 cm; 7×0.2 cm, pale green, terete, adaxially grooved above, abaxially rounded; lamina simply pinnate, size 33×6 cm, lanceolate, pinnae 25-35 pairs, reduced at base, alternate, sessile, apex acute or rounded, base overlapping the rachis and adjacent pinna, margin crenate, serrate towards apex, largest pinnae 4×1 cm, veins free, simple, forked once, not reaches to the margin. Sori 1 mm,15-20 sori per pinnae, sub marginal, reniform, brown. (Plate 6, fig 2a-2d)

Ecology-Epiphytic or epilithic herbs along shady places.

Current status -Least Concern

Nephrolepis hirsutula(G.Forst.) C.Presl

Rhizome erect, or suberect, 1-2mm thick, with stilts of runners, scaly; frond 90×15 cm, simply pinnate; stipe 30-cm, basal pinnae long, distant, middle pinnae straight. sterile pinnae herbaceous, thick, base strongly unequal, auricled, margin in the base entire, crenate towards apex, apex acute; fertile pinnae strongly crenate than the apex; rachis densely covered with scales, scales on lamina persistent, hairs absent in lamina and costa .Sori submarginal to nearly medial, 25-30 pairs on fully fertile pinnae, round not impressed, indusium reniform.

Ecology -Terrestrial lithophytes or epiphytes on shady places. (Plate 6, fig 3a-3d).

Current Status – Least Concern.

POLYPODIACEAE

Key to the species

- 1.Frond pinnatifid ,stellate hairs absent.....*Aglaomorpha*
- 1.Frond simple,stellate hairs present below.....*Pyrrosia*

AGLAOMORPHA Schott

Plants epiphytic or epilithic; rhizome shortly to long creeping; Fronds usually dimorphic, with basal and foliage frond, basal frond sessile, ovate -elliptic; foliage frond stalked (usually fertile), pinnatifid, basal pinnae reduced; costa, costules, and main veins prominent abaxially. Sori small, in long along veins.

Aglaomorpha quercifolia (L.) Hovenkamp & S.Linds.

Rhizome long creeping, 6 cm thick, densely covered by scales; scales linear or lanceolate, dark brown at base, light brown towards apex, 1×0.1cm, apex long acuminate, base cordate, margin ciliated; frond dimorphic, sterile frond smaller than fertile frond and thickly overlapped on the rhizome, 15×10 cm, ovate, sessile, apex acute, base cordate, margin lobed, costa and costules raised above and below, reticulate venation, veinlets anastomosing; fertile frond simply pinnate, size 70×30 cm, stipe 15×0.6 cm, adaxially flattened or slightly grooved, abaxially rounded; lamina oblong, pinnately lobed, lobes 10-23 pairs, lanceolate, adnate, alternate, acuminate apex, margin entire, basal pairs much reduced; costa slightly raised above and ridged below; sori numerous, rounded, brown. (Plate 6, fig 4a-4d)

Ecology -Epiphytes or epilithic along fully exposed places.

Current status -Least Concern.

PYRROSIA Mirb.

Herbs, epiphytic or epilithic, occasionally terrestrial, forms extensive colonies. Rhizome short creeping to widely trailing, densely covered with scales, scales lanceolate; fronds articulates to the phyllopodia, mono or dimorphic, usually sessile, covered with stellate hairs, veins prominent on the abaxial side of the lamina. Sori round to slightly elongated, situated dorsally or terminally on the included veins.

Key to the Species

1. Sterile lamina lanceolate or elliptical.....*P.lanceolata*

1. Sterile lamina rounded or oval.....*P.heterophylla*

Pyrrrosia lanceolata (L.) Farwell

Rhizome long creeping, 1.5mm thick, slender, terete, covered by scales all over; scales lanceolate, 2×0.5mm, reddish brown spot at centre, pale brown at periphery, apex acuminate, margin dentate; Fronds many, 12×1cm, simply pinnate; stipe short, 1.5×0.5 cm, terete, slender, scales densely at the very base. Lamina 10.5×1 cm, oblong or lanceolate, hairy, apex acute or rounded, veins immersed. Sori 1mm in diameter, brown, rounded, scattered on either side of the costa.

Ecology -epiphytes on trees and fully or partially shaded places. (Plate 7 fig 1a-1d)

Current status -Least Concern.

Pyrrrosia piloselloids (L.) M.G.Price

Rhizome long, creeping, 1mm thick, covered scales; scales, small, almost round or heart shaped, darker at centre, paler at edges, hairs on edges; fronds lightgreen, fleshy, oval to circular with smooth edges and dimorphic. Lamina simple, entire. Sterile lamina without stalks, nearly circular, 1cm across, fleshy with smooth surface; fertile lamina, stalked (1cm long), 3-12×0.5×0.8 cm. Sori arranged in a broad band along the edge of lamina, 2.5mm long.

Ecology -epiphytes on old tree trunks. (Plate 7, fig 2a-2d)

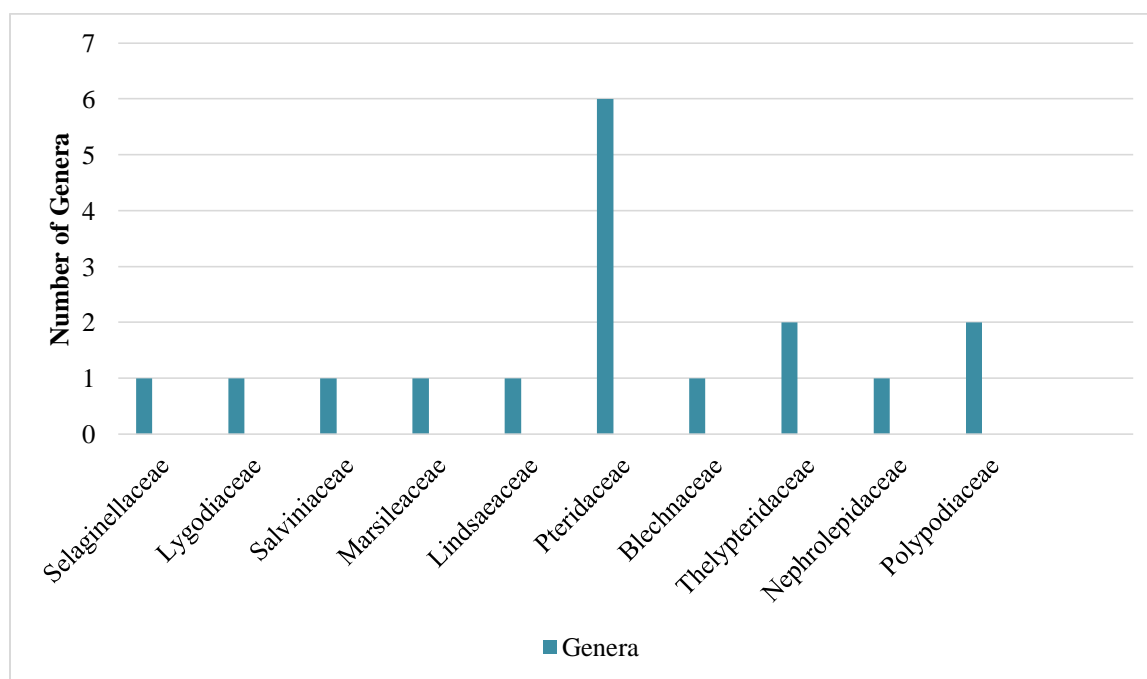
Current status – Least Concern.

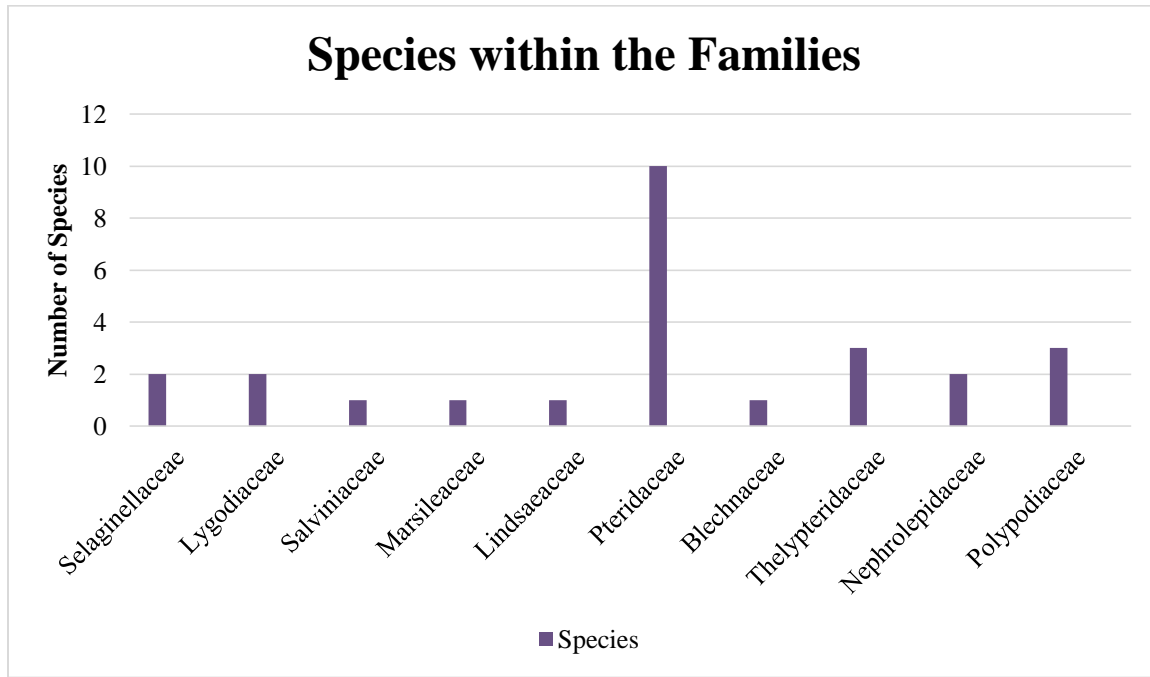
Table 1.1: Ferns and Lycophytes of Thazhava Grama Panchayat

Family	Genus	Species
1. Selaginellaceae	1. <i>Selaginella</i>	1. <i>S. delicatuda</i>
		2. <i>S. ciliaris</i>
2. Lygodiaceae	2. <i>Lygodium</i>	3. <i>L. flexuosum</i>
		4. <i>L. microphyllum</i>
3. Salviniaceae	3. <i>Salvinia</i>	5. <i>S. molesta</i>
4. Marsileaceae	4. <i>Marsilea</i>	6. <i>M. minuta</i>
5. Lindsaeaceae	5. <i>Lindsaea</i>	7. <i>L. ensifolia</i>
6. Pteridaceae	6. <i>Adiantum</i>	8. <i>A. caudatum</i>
		9. <i>A. latifolium</i>
		10. <i>A. philippense</i>
	7. <i>Ceratopteris</i>	11. <i>C. thalictroides</i>
	8. <i>Cheilanthes</i>	12. <i>C. tenuifolia</i>
	9. <i>Parahemionitis</i>	13. <i>P. arifolia</i>
	10. <i>Pityrogramma</i>	14. <i>P. calomelanos</i>
	11. <i>Pteris</i>	15. <i>P. confusa</i>
		16. <i>P. perrottetii</i>
17. <i>P. praetermissa</i>		
7. Blechnaceae	12. <i>Stenochlaena</i>	18. <i>S. palustris</i>
8. Thelypteridaceae	13. <i>Cyclosorus</i>	19. <i>Cyclosorus interruptus</i>
	14. <i>Christella</i>	20. <i>C. dentata</i>
		21. <i>C. parasitica</i>
9. Nephrolepidaceae	15. <i>Nephrolepis</i>	22. <i>N. cordifolia</i>
		23. <i>N. hirsutula</i>
10. Polypodiaceae	16. <i>Aglaomorpha</i>	24. <i>A. quercifolia</i>
	17. <i>Pyrrrosia</i>	25. <i>P. lanceolata</i>
		26. <i>P. piloselloides</i>

GENERA AND FAMILIES

In this study 26 species of pteridophyte under 17 genera and 10 families were collected from the study area (Table 1). In which Pteridaceae is the largest family with 6 genera and 10 species (*Adiantum caudatum* L., *Adiantum latifolium* Lam., *Adiantum philippense* L., *Ceratopteris thalictroides* (L.) Brongn., *Cheilanthes tenuifolia* (Burm.f.) Sw., *Parahemionitis arifolia* (Burm.f.) Panigrahi, *Pityrogramma calomelanos* (L.) Link, *Pteris confusa* T.G.Walker, *Pteris perrottetii* Heiron., *Pteris Praetermissa* T.G.Walker) followed by Polypodiaceae with 2 genera and 3 species (*Aglaomorpha quercifolia* (L.) Hovenkamp & S.Linds., *Pyrrhosia lanceolata* (L.) Farwell, *Pyrrhosia piloselloides* (L.) M.G.Price) and Thelypteridaceae also having 2 genera and 3 species (*Cyclosorus interruptus* (Willd.) H.Ito, *Christella dentata* (Forssk.) Brownsey & Jeremy, *Christella parasitica* (L.) H.Lev., Nephrolepidaceae with 1 genus and 2 species (*Nephrolepis cordifolia* (L.) C.Presl, *Nephrolepis hirsutula* (G.Forst.) C.Presl), Lygodiaceae with 1 genus and 2 species (*Lygodium flexuosum* (L.) Sw., *Lygodium microphyllum* (Cav.) R.Br.), Selaginellaceae is having 1 genus and 2 species (*Selaginella delicatula* (Desv.ex.Poir) Alston, *Selaginella ciliaris* (Retz.) Spring). The following families are with 1 genus and 1 species; Salviniaceae (*Salvinia molesta* D.Mitch), Marsileaceae (*Marsilea minuta* L.), Lindsaeaceae (*Lindsaea ensifolia* Sw.), Blechnaceae (*Stenochlaena palustris* (Burm.f) Bedd.).





The pteridophytes are also diverse in their habitat (graph 3), i.e., 14 species were terrestrial, 3 species were epiphytes, epilithic, aquatic and climbers each.

Among the collected species most species are included in least concern category; *Salvinia molesta* included in Invasive Species Specialist Group and *Pteris perrottetii* is endemic to South India according to IUCN.

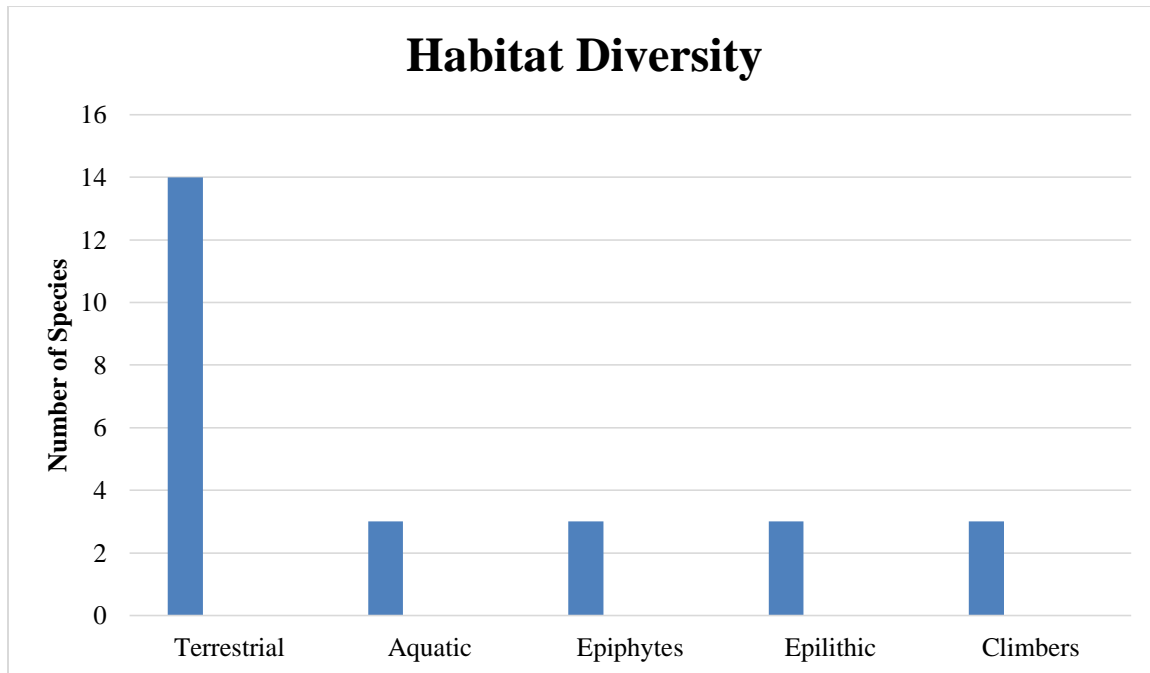


PLATE 1



Fig 1a-1d: *Selaginella delicatula*. 1a. Habit, 1b-Frond, 1c.Spike, 1d. Sporophyll
 Fig 2a-2d: *Selaginella ciliaris*. 2a. Habit, 2b-Frond, 2c.Spike, 2d.Sporophyll
 Fig 3a-3d: *Lygodium flexuosum*. 3a. Habit, 3b-Fertile pinnae, 3c.Sterile pinnae, 3d.Strobili
 Fig 4a-4d: *Lygodium microphyllum*. 4a. Habit, 4b-Stem, 4c.Pinnae, 4d.Strobili

PLATE 2



Fig 1a-1d:*Salvinia molesta*. 1a. Habit, 1b-Floated leaf, 1c. Submerged leaf, 1d. Sporocarp
 Fig 2a-2d:*Marsilea minuta*. 2a. Habit, 2b-Frond, 2c. Rhizome, 2d. Sporocarp
 Fig 3a-3d:*Lindsaea ensifolia*. 3a. Habit, 3b-Lamina, 3c. Sori, 3d. Rhizome scale
 Fig 4a-4d:*Adiantum caudatum*. 4a. Habit, 4b-Frond, 4c. Sori, 4d. Rhizome scale.

PLATE 3

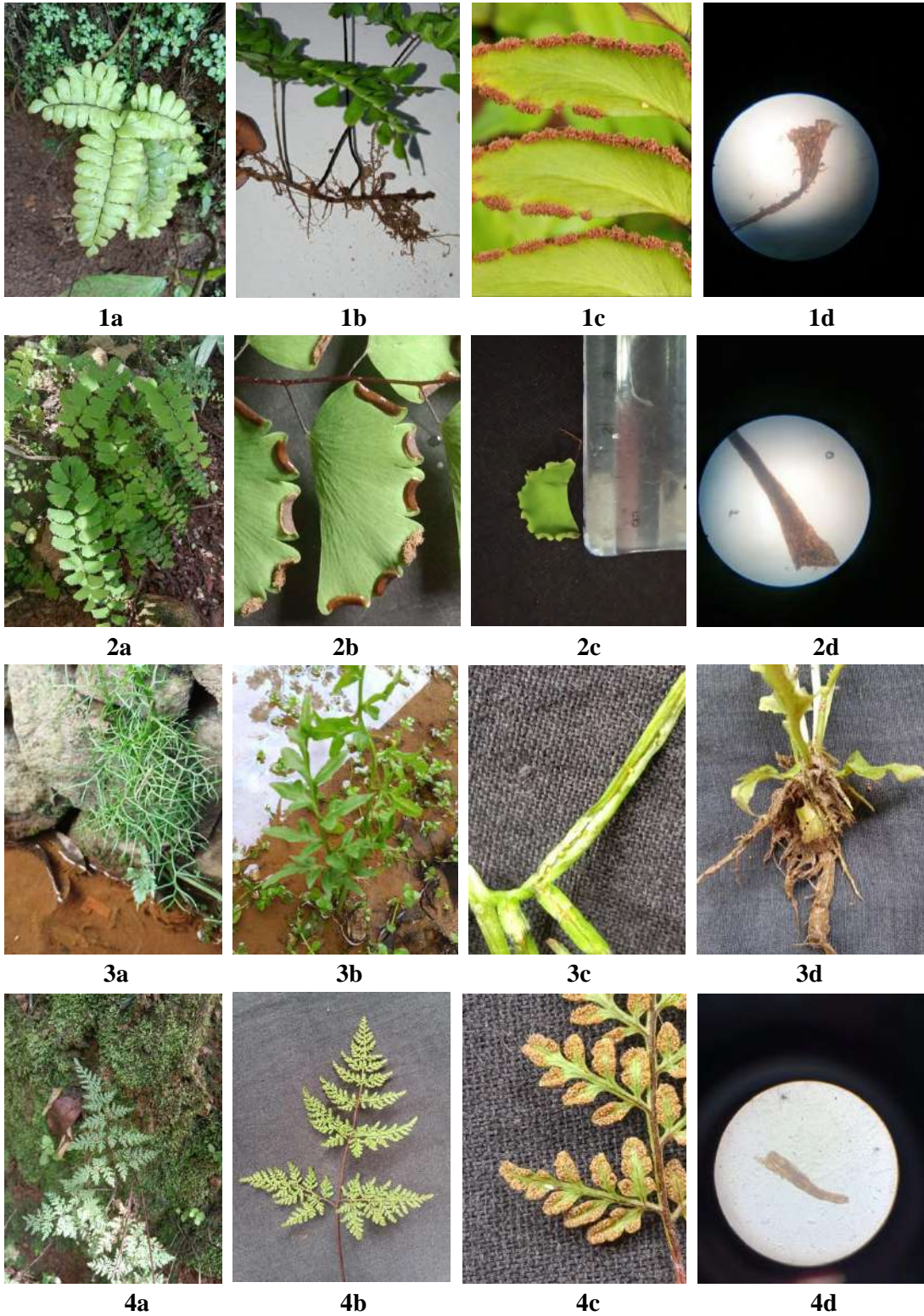


Fig 1a-1d: *Adiantum latifolium*. 1a. Habit, 1b. Rhizome, 1c. Sori, 1d. Rhizome scale
 Fig 2a-2d: *Adiantum philippense*. 2a. Habit, 2b. Sori, 2c. Pinna, 2d. Rhizome scale
 Fig 3a-3d: *Ceratopteris thalictroides*. 3a. Habit, 3b. Sterile frond, 3c. Sori, 3d. Rhizome
 Fig 4a-4d: *Cheilanthes tenuifolia*. 4a. Habit, 4b. Frond, 4c. Sori, 4d. Rhizome scale.

PLATE 4

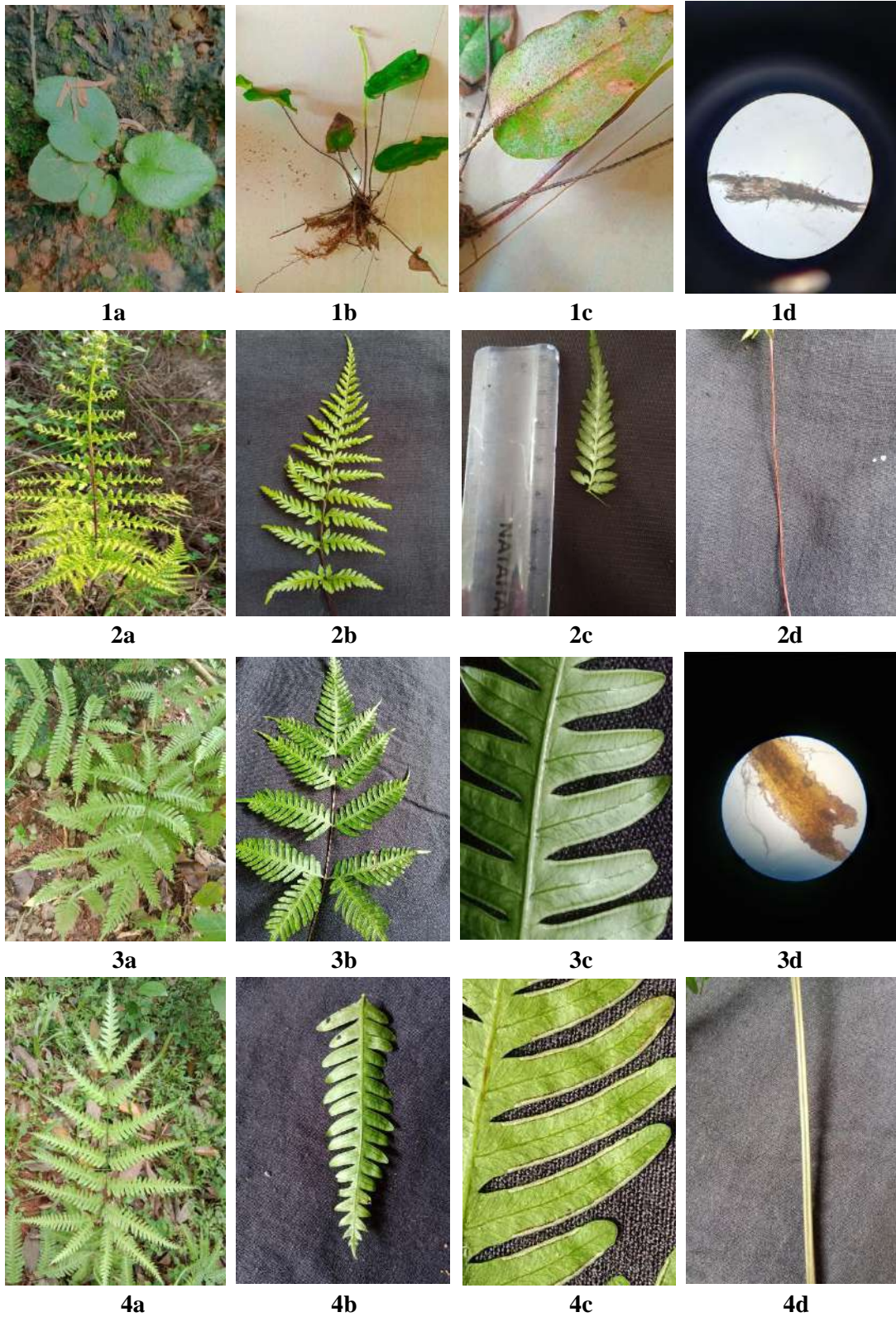


Fig 1a-1d: *Parahemionitis arifolia*. 1a. Habit, 1b-Plant, 1c. Leaf abaxial view, 1d. Rhizome scale
 Fig 2a-2d: *Pityrogramma calomelanos*. 2a. Habit, 2b-Frond, 2c. Pinna, 2d. Stipe
 Fig 3a-3d: *Pteris confusa*. 3a. Habit, 3b-Lamina, 3c. Sori, 3d. Rhizome scale
 Fig 4a-4d: *Pteris perrottetii*. 4a. Habit, 4b-Pinna, 4c. Sori, 4d. Rhizome scale.

PLATE 5

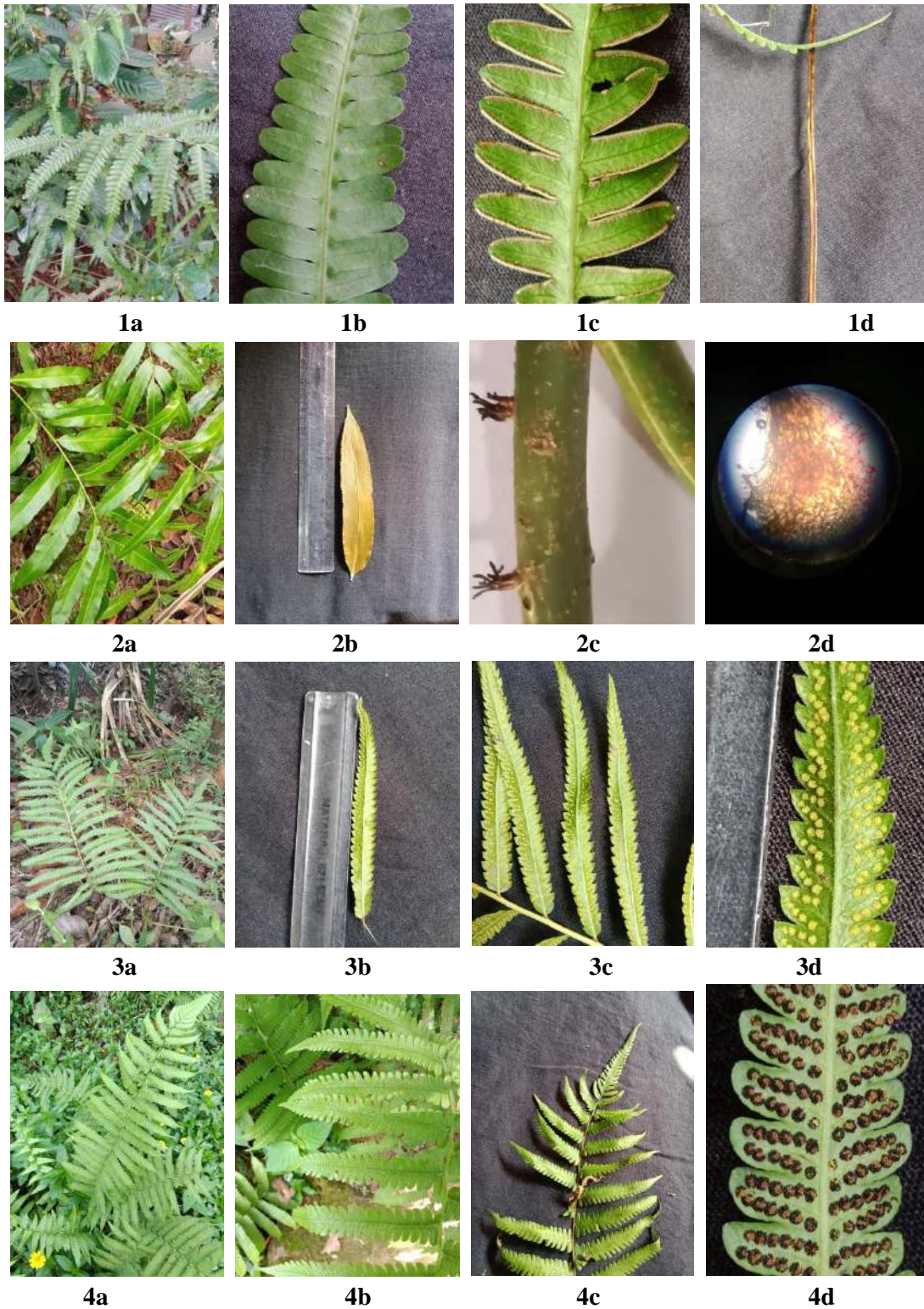


Fig 1a-1d: *Pteris praetermissa*. 1a. Habit, 1b. Pinna, 1c. Sori, 1d. Stipe
 Fig 2a-2d: *Stenochlaena palustris* 1a. Habit, 1b. Pinna, 1c. Rhizome with root tufts, 1d. Rhizome Scale
 Fig 3a-3d: *Cyclosorus interruptus* 1a. Habit, 1b. Pinna, 1c. Lamina, 1d. Sori
 Fig 4a-4d: *Christella dentata*. 4a. Habit, 4b. Pinnae, 4c. Frond, 4d. Sori

PLATE 6

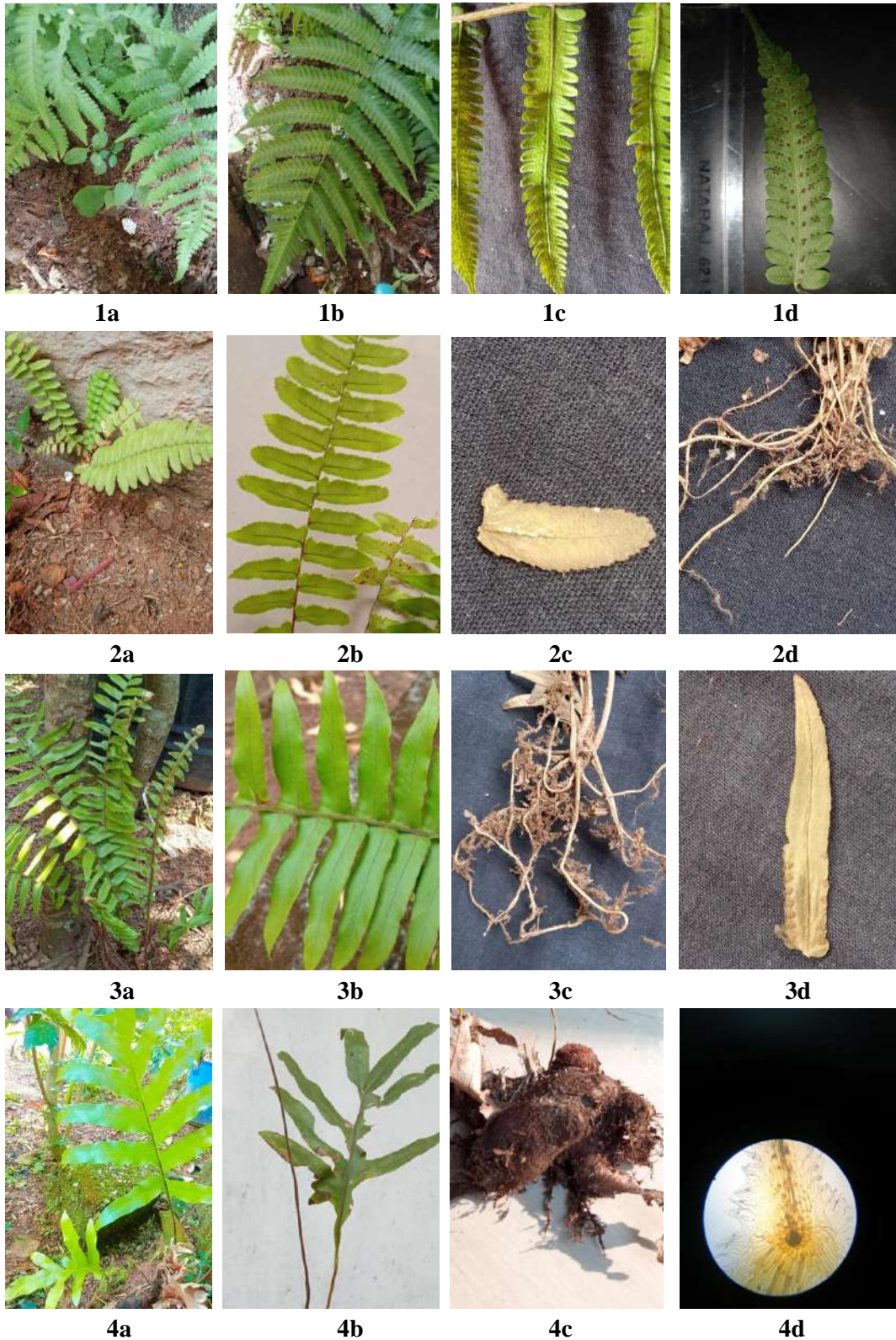


Fig 1a-1d: *Christella parasitica* 1a. Habit, 1b- Lamina, 1c. Pinnae, 1d. Sori
 Fig 2a-2d: *Nephrolepis cordifolia*. 2a. Habit, 2b- Lamina, 2c. Pinna, 2d. Rhizome
 Fig 3a-3d: *Nephrolepis hirsutula*. 3a. Habit, 3b- Pinnae, 3c. Rhizome, 3d. Pinna with sori
 Fig 4a-4d: *Algaomorpha quercifolia*. 4a. Habit, 4b- Frond, 4c. Rhizome, 4d. Rhizome scale.

PLATE 7

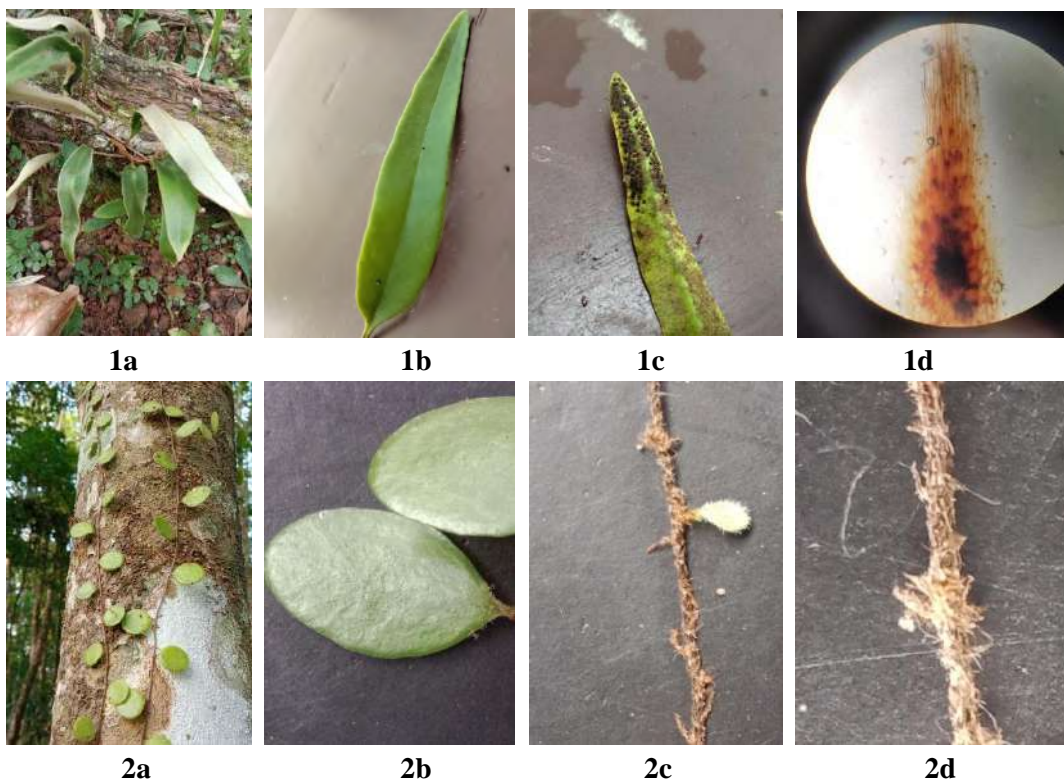


Fig 1a-1d: *Pyrrrosia lanceolata*. 1a. Habit, 1b-leaf, 1c. Sori, 1d. Rhizome scale
Fig 2a-2d: *Pyrrrosia piloselloides*. 2a. Habit, 2b-Leaf, 2c. Young leaf, 2d. Rhizome

SUMMARY AND CONCLUSION

Pteridophytes are a group of flowerless, seed free, and spore bearing vascular plants with two distinct lineages, i.e., lycophytes and ferns. They distinguished from all other plants by a lifecycle with fully independent gametophyte and sporophyte generations, with the sporophyte being dominant. These are second largest vascular plants with about 12000 species and 337 genera in the world. Objectives of the present study is to collect the ferns and lycophytes of Thazhava Gram panchayat, identify and enumerate the collected ferns and lycophytes based on PPG 1 classification, and to analyze the threatened and endemic pteridophytes of Thazhava Gram Panchayat and give importance to their conservation.

The present study was mainly based on the materials collected from different localities of Thazhava Gram Panchayat. The collected specimens were critically studied and identified with the help of authentic taxonomic literatures. Herbaria were prepared with standard techniques and deposited in College Herbaria. Collected species from the study area were introduced to the Green House of the College.

In this study 26 species of Pteridophyte under 17 genera and 10 families were collected from the study area (Table.1). In which Pteridaceae is the largest family with 6 genera and 10 species (*Adiantum caudatum* L., *Adiantum latifolium* Lam., *Adiantum philippense* L., *Ceratopteris thalictroides* (L.) Brongn., *Cheilanthes tenuifolia* (Burm.f.) Sw., *Parahemionitis arifolia* (Burm.f.) Panigrahi, *Pityrogramma calomelanos* (L.) Link, *Pteris confusa* T.G.Walker, *Pteris perrottetii* Heiron., *Pteris Praetermissa* T.G.Walker) followed by Polypodiaceae with 2 genera and 3 species (*Aglaomorpha quercifolia* (L.) Hovenkamp & S.Linds., *Pyrrhosia lanceolata* (L.) Farwell, *Pyrrhosia piloselloides* (L.) M.G.Price) and Thelypteridaceae also having 2 genera and 3 species (*Cyclosorus interruptus* (Willd.) H.Ito, *Christella dentata* (Forssk.) Brownsey & Jeremy, *Christella parasitica* (L.) H.Lev., Nephrolepidaceae with 1 genus and 2 species (*Nephrolepis cordifolia* (L.) C.Presl, *Nephrolepis hirsutula* (G.Forst.) C.Presl), Lygodiaceae with 1 genus and 2 species (*Lygodium flexuosum* (L.) Sw., *Lygodium microphyllum* (Cav.) R.Br.), Selaginellaceae is having 1 genus and 2 species (*Selaginella delicatula* (Desv.ex.Poir) Alston, *Selaginella ciliaris* (Retz.) Spring). The following families are with 1 genus and 1 species; Salviniaceae (*Salvinia molesta* D.Mitch), Marsileaceae (*Marsilea minuta* L.), Lindsaeaceae (*Lindsaea ensifolia* Sw.), Blechnaceae (*Stenochlaena palustris* (Burm.f) Bedd.).

The pteridophytes are also diverse in their habitat (graph 3), i.e.,14 species were terrestrial,3 species were epiphytes, epilithic, aquatic and climbers each. Among the collected species most species are included in least concern category; *Salvinia molesta* included in Invasive Species Specialist Group and *Pteris perrottetii* is endemic to South India according to IUCN.

A check list of 26 pteridophytes and detailed description with current status and updated nomenclature were provided. A bracketed key was prepared for families, genera, and species based on the pteridophytes collected from the study area. Colour plates with habit, pinnae, pinnule, sori, scales also provided for the identification. Being a suppressed plant group, the overall diversity of pteridophyte in the selected area was less. Climatic conditions, study duration, humidity, temperature etc. could be the contributing factors.

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