



# Potential uses of lycophytes and ferns in Sri Lanka: an ethnopteridological perspective

R.H.G. Ranil and Rainer W. Bussmann

## Databases and Inventories

### Abstract

**Background:** Ethnopteridology is a branch of ethnobotany researching the relationship between pteridophytes and humans. Unlike many seed plants, pteridophytes are generally not extensively used. However, it has long been reported that tropical ferns are used by various indigenous communities. Literature highlighted that to date no comprehensive ethnopteridological survey was performed in Sri Lanka, though it is known that some pteridophytes are used by local communities as home remedies and food sources. Our objective was to present a comprehensive review of the relationships between the pteridophytes and local communities.

**Methods:** We tried to compile a list of potential uses of pteridophytes of Sri Lanka after a comprehensive review of relevant literature and based on gathered information from informal discussions with village communities and indigenous medical practitioners.

**Results:** Here we identified 37 species with medicinal, food, ornamental, and other uses. Of these 10 species have categorized as threatened under the National Red List-2020. This article documents that pteridophytes have immense potential to be used as food, medicinal and ornamental, and that they still remain neglected.

**Conclusions:** It is evident that although a considerable number of Sri Lankan pteridophyte species have potential as food, medicinal and ornamental species, they still remain underutilized and neglected crop genetic resources. Further, this study is emphasized that such species and their associated knowledge are at risk and highly vulnerable to changing physical environment,

increasing population pressure, and rapid development of socio-economic status of Sri Lanka.

**Keywords:** Ethnopteridology, Indigenous knowledge, Traditional uses, Folk taxonomy

### Correspondence

R.H.G. Ranil<sup>1\*</sup> and Rainer W. Bussmann<sup>2</sup>

<sup>1</sup>Department of Crop Science, Faculty of Agriculture, University of Peradeniya, Sri Lanka

<sup>2</sup>Department of Ethnobotany, Institute of Botany, Iliia State University, Tbilisi, Georgia

\*Corresponding Author: rrajapaksha@agri.pdn.ac.lk

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### Background

All over the world, there has been an increasing interest in the scientific study of man-plant interactions in the natural environment (Davis *et al.* 2009; Guiney & Oberhauser 2009; Nisbet & Zelenski 2013; Srivastava 2007). Today, ethnobotany has become an important and crucial area of research for resource management, and conservation of biodiversity, at genetic, species and ecosystem levels, and socio-economic development (Srivastava 2007). Ethnopteridology is a branch of Ethnobotany that studies the uses of ferns by humans (Keller & Prance, 2015).

Though there are many investigations of the economic values of edible higher plants, pteridophytes mostly been ignored (Mannan *et al.* 2008). Although pteridophytes are of minor ecological and economic significance today, they

dominated the world's vegetation and contributed much to the world's coal reserves (de Winter & Amoroso 2003). Since remote times human populations in many parts of the world have made use of ferns and lycophytes. The archaeological literature offers much evidence of the close relationship between humans and these plants over many generations (Keller & Prance 2015). As the first vascular plants, pteridophytes are an ancient lineage, and human beings have been documented to have been using pteridophytes for over 2000 years (Baskaran *et al.* 2018).

According to Keller & Prance (2015) fern ethnobotany is nothing new, and that there is lots of data about ferns and local cultures in literature. Keller & Prance (2015) provided the most comprehensive review on the uses of lycophytes and ferns on a global scale. Ethnobotanical studies of ferns and lycophytes have been carried out in South America (Keller *et al.* 2011). Though Asia harbors the remarkable diversity of pteridophytes, their uses have not been properly documented, except for some studies in China and India (Srivastava 2007; Mannan *et al.* 2008; Singh & Singh 2012; Benniamin 2011; Sinh & Khare 2011; Yumkham 2017; Singh & Rajkumar 2017; Singh 2018).

Despite its small land size, Sri Lanka harbors nearly 390 pteridophyte taxa with 42 endemics, but they are still not adequately taxonomically studied in comparison to the neighboring countries (Ranil *et al.* 2021a). Sri Lanka's pteridophytes are important both at a regional and global scale because of the country's position as a major, western outlier of the Asia-Pacific pteridophyte flora (Ranil *et al.* 2019). The National Red List-2020 highlighted that out of 350 native taxa, 59% are in the threatened category (Ranil *et al.* 2020). Future studies should mainly focus on their biological conservation and sustainable management. Moreover, the exploration of their economic potential is important. Ranil *et al.* (2021b) highlighted that to date no comprehensive ethnoperidological survey was performed in Sri Lanka, though it is known that some pteridophytes are used by local communities as home remedies and food sources. Our objective was to present a comprehensive review of the relationships between the pteridophytes and local communities.

## Materials and Methods

Information was mainly collected after reviewing historical and recent publications. Information related to medicinal uses was validated in consultations with indigenous medical practitioners, after obtaining their oral prior informed consent. Previously documented information was analyzed, critically evaluated, and updated, integrating information obtain from uses of pteridophytes worldwide. The first author used and

critically examined his personal field notes on surveys of specimen collections of Sri Lankan ferns over the period from 2003 to 2020. Because such a large time was covered, there was no unified methodology, other than participants provided oral prior informed consent. After analyzing all collected data, the information was arranged under their medicinal, food, ornamental, and another minor or uncommon uses and agricultural importance along with their special characteristics relevant to uses. We also compiled all common names used for pteridophytes found in literature and based on interview data. Botanical names were arranged according to the PPGI system. All species were arranged alphabetically in each table under different use categories.

## Results and Discussion

### Ethnoperidological history of Sri Lanka

Paul Hemann's Ceylon herbarium, dating back to the period of 1672-1679, while he was serving as a chief medical officer for the Dutch East India Company, is considered the first systematic collection of the flora of Sri Lanka, (Cramer 2005; Andel & Barth 2018; Andel *et al.* 2018). His specimen collection included few pteridophyte specimens and drawings and is currently deposited at four European herbaria (Andel & Barth 2018; Ranil *et al.* 2021b). Hemann mentioned the ethnobotanical uses and common names for few fern species collected during his tenure in colonial Ceylon.

Alexander Moon worked from 1821-1843 as the first superintendent of the Royal Botanic Garden, in Peradeniya, Sri Lanka, and gave special attention to collect local names for plants during his botanical work in Sri Lanka. Moon's first acquaintance with Sri Lankan plants was associated with a subsequent relationship with the local people and their innate interest in the plants in their surrounding environment (Cramer 2001). He used such knowledge and experience in his nomenclatural system of native plants of Sri Lanka (A Catalogue of the Indigenous and Exotic Plants Growing in Ceylon, 1824). Moon's list of plants includes 3360 vernacular names (Petch 1922), including of 38 pteridophyte species. Moon's catalog is one the best examples of the use of traditional knowledge of plants for botanical nomenclature. He was the first botanist who documented the local term for ferns as "*meewana*". Part of his pteridophyte list is given in Figure 1, while Table 1 shows some of the local named used in his list. Trimen (1885) also listed some of the pteridophyte species with their local names in his systematic catalog of the flowering plants and ferns of Ceylon. Apart from mentioning local names, none of them however provided any detailed information on their uses by the local community.

Ranil *et al.* (2004) compiled a list of pteridophytes used by village communities during their diversity assessment of lycophytes and ferns in Kanneliya Man and Biosphere Reserve. Moreover, Ranil *et al.* (2005) conducted a survey on uses of pteridophytes while interviewing village physicians and indigenous community members, and summarized the food,

ornamental and medicinal value of pteridophytes with examples. The potential of pteridophytes for the Sri Lankan floriculture industry has discussed by Ranil *et al.* (2015), while providing a wealth of information on aesthetic values and market values of native pteridophytes.

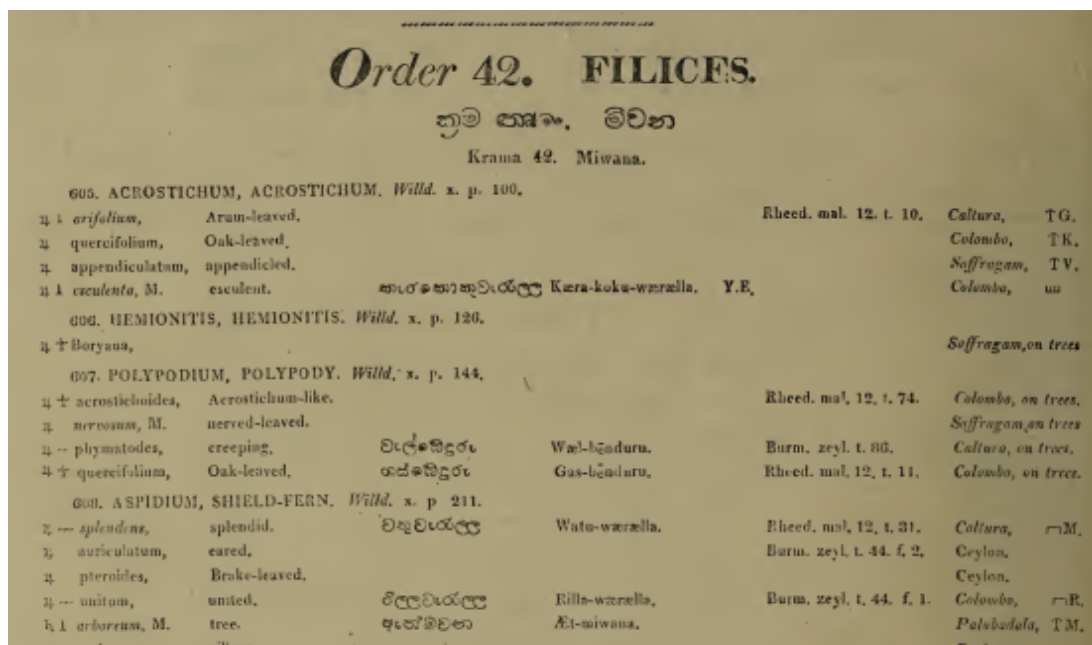


Figure 1. A part of a page of Moons catalog with common names written in native language.

Table 1. A comparison between historically used common names and current names

Botanical name used by Moon (1884)	Common name used by Moon (1884)	Name according to PPGI (2016)	Currently used common name
<i>Acrostichum esculenta</i>	Kaer-koku-waeraella	<i>Acrostichum aureum</i> L.	Keran-koku
<i>Adiantum lunulatum</i>	Kaha-waeralla	<i>Adiantum philippense</i> L.	Not found
<i>Aspidium arboreum</i>	Aet-miwana	?	Not found
<i>Aspidium splendens</i>	Watu-waeraella	<i>Nephrolepis biserrata</i> (Sw.) Schott	Rilla
<i>Aspidium unitum</i>	Rilla-waeraella	<i>Cyclosorus interruptus</i> (Willd.) H. Itô	Not found
<i>Aspidium viviparum</i>	Ganga-miwana	* <i>Polystichum heterolepis</i> Fée	Not found
<i>Asplenium esculentum</i>	Miwana-pala	<i>Diplazium esculentum</i> (Retz.) Sw.	Miyena-dalu
<i>Blechnum orientale</i>	Pattra-waeraella	<i>Blechnum orientale</i> L.	Baru-koku, Pattra-gas
<i>Lomaria scandens</i>	Wael-barandara	<i>Stenochlaena palustris</i> (Burm. f.) Bedd.	Not found
<i>Polypodium</i>	Wael-benduru	<i>Microsorium scolopendria</i> (Burm. f.) Copel.	Not found
<i>Polypodium quercifolium</i>	Gas-benduru	<i>Drynaria quercifolia</i> (L.) J. Sm	Benduru, Del-path benduru
<i>Pteris lanuginosa</i>	An-kaekilla	<i>Pteridium revolutum</i> (Blume) Nakai	Monara-kekillla
<i>Pteris thalictroides</i>	Pilihudu-pala	<i>Ceratopteris thalictroides</i> (L.) Brogn.	Gona-un, Pilihudu-pala

Note: \*There are no records to prove occurrence of *Polystichum heterolepis* Fée in Sri Lanka. Apparently, it is a misidentification of other common *Polystichum* species in Sri Lanka.

### Folk nomenclature

Folk taxonomy deals with the traditional naming and classification of organisms and unlike its scientific counterpart, folk taxonomy is mostly undocumented (Phaka *et al.* 2019). Folk names of plants are the basis of traditional plant biodiversity knowledge (Khasbagan & Soyolt 2008). Such folk names assigned to species often carry etymological information such as therapeutic effects, morphological features, mythical connotations, and allegorical values (Nnamani *et al.* 2019). For example, in Sri Lanka *Pyrosia heterophylla* is locally called "*kasi-pethi*" which translates to "coins." Due to

their morphological similarity to coins, the fleshy and rounded leaves are in fact used as coins by local children in their playhouses (Fig. 2G). *Ceratopteris thalictroides* is locally known as "*Gona-an*" which means "horns of sambar deer" based on its similar leaf morphology to horns of a deer. Apparently, the local name, "*Gini-hota*" for tree ferns, (Gini= fire, hota = beak) was derived from its specific use by village communities in the lowland rainforest of Sri Lanka. Once burnt, the upper part of the stem with a coiled frond appears like a burning beak of a bird. The vernacular names used by Sri Lankans across the county are given in Table 2.

Table 2. Common names used for pteridophytes of Sri Lanka

Family and botanical names	Common names
Aspleniaceae <i>Asplenium nidoides</i> Fraser-Jenk. & Kandel	Kurulu-kedeli-meewana, Gal-palu
Athyriaceae <i>Diplazium esculentum</i> (Retz.) Sw.	Miwana-pala, Miyena-dalu, Idal-pala, Kokum-pala
Blechnaceae <i>Blechnopsis orientalis</i> (L.) C. Presl <i>Stenochlaena palustris</i> (Burm. f.) Bedd.	Baru-koku, Pattra-gas Wael-barandara
Cyatheaceae <i>Alsophila walkerae</i> (Hook.) J. Sm. <i>Gymnosphaera gigantea</i> (Wall. ex Hook.) S.Y. Dong <i>Sphaeropteris crinita</i> (Hook.) R.M. Tryon	Gini-hota, Gini-watara, Pattra-gas do do
Dennstaedtiaceae <i>Pteridium revolutum</i> (Blume) Naka	Monara-kekilli, An-kekilli
Gleicheniaceae <i>Dicranopteris linearis</i> (Burm. f.) Underw. <i>Dicranopteris taiwanensis</i> Ching & P.S. Chiu	Kekilla Kekilla
Lycopodiaceae <i>Palhinhaea cernua</i> (L.) Franco & Vasc. <i>Phlegmariurus phlegmaria</i> (L.) Holub <i>Phlegmariurus phyllanthus</i> (Hook. & Arn.) R.D. Dixit <i>Phlegmariurus squarrosus</i> (G. Forst.) A. Löve & D. Löve	Badal-hanassa Maha-hedaya Kuda-hedaya
Lygodiaceae <i>Lygodium microphyllum</i> (Cav.) R. Br. <i>Lygodium flexuosum</i> (L.) Sw. <i>Lygodium circinnatum</i> (Burm.f.) Sw.	Pamba-wel Pamba-wel Maha-pamba
Marattiaceae <i>Angiopteris crassipes</i> Wall. ex C. Presl. <i>Angiopteris helferiana</i> C. Presl.	Wal-meda Wal-meda
Marsileaceae <i>Marsilea coromandelina</i> Willd. <i>Marsilea minuta</i> L.	Hathara-petiya, Pethi-pala
Nephrolepidaceae <i>Nephrolepis biserrata</i> (Sw.) Schott <i>Nephrolepis falciformis</i> J. Sm. <i>Nephrolepis brownii</i> (Desv.) Hovenkamp & Miyam.	Watu-werella, Rilla Rilla Rilla
Ophioglossaceae <i>Helminthostachys zeylanica</i> (L.) Hook. <i>Ophioderma pendula</i> (L.) C. Presl. <i>Ophioglossum reticulatum</i> L.	Thani-wel Pati-dhatu Ek-pethi-pium
Polypodiaceae <i>Drynaria quercifolia</i> (L.) J.Sm.	Benduru, Del-path benduru

<i>Pyrrosia heterophylla</i> (L.) M.G. Price	Kasi-pethi, Panam-pethi, Salli-pethi
<i>Microsorium scolopendria</i> (Burm.f.) Copel.	Wael-benduru
Pteridaceae	
<i>Acrostichum aureum</i> L.	Keran-koku
<i>Adiantum capillus-veneris</i> L.	Wal-venna
<i>Adiantum caudatum</i> L.	Thuda-wediya
<i>Adiantum philippense</i> L.	Kaha-waeralla
<i>Ceratopteris thalictroides</i> (L.) Brogn.	Gona-an, Pilihudu-pala
<i>Parahemionitis cordata</i> (Roxb. ex Hook. et Grev.) Fraser-Jenk.	Kalu-goltukola
Thelypteridaceae	
<i>Cyclosorus interruptus</i> (Willd.) H. Itô	Rilla- waeraella

### Medicinal uses

Studies of uses of ferns in ethnomedicine are abundant on all inhabited continents, e.g. Americas and Asia (Keller and Prance, 2015). Recent and updated information on the medicinal uses of ferns in Europe and Africa is however, astonishingly, not readily available. Pteridophytes can be considered an important group of plants in Asian folklore medicine. Mannan *et al.* (2008) have explained their uses in the Homoeopathic, Ayurvedic, Tribal, and Unani medicines. Among Asian countries, Indian pteridophytes have been extensively studied for their ethnomedicinal uses (Singh & Rajkumar 2017).

Communities in Sri Lanka have developed their own medical system over a period of 3000 years, based on a series of prescriptions handed down from generation to generation (Samaranayake & Pushpakumara 2016), and plants and their products have been systematically used for treating illnesses

for at least a thousand years (Napagoda *et al.* 2018). Among the native flora of Sri Lanka, more than 1400 plants are used in indigenous medicine (Sugathadasa *et al.* 2008; Wijesundara 2004). However, these authors hardly included any pteridophytes while estimating the number of plants with medicinal properties, perhaps due to inadequate literature and lack of current uses. None of the European collectors in Sri Lanka documented in detail medicinal ferns in their botanical, ecological, and environmental surveys, and they also failed in general to provide detailed information on their ethnomedicinal uses and medicinal properties. Jayaweera (1984) is the only botanist who compiled detailed information on the medicinal properties and uses of a few pteridophyte species, but this comprehensive work is limited to eight pteridophyte species of Sri Lanka (Table 3).

Table 3. Medicinally important species and their significance

Species	Medicinal properties/ uses
<i>Adiantum caudatum</i> L.	The leaves are used in diabetes and as a cure for coughs and fevers. Externally, they are applied on diseases of the skin.
<i>Adiantum philippense</i> L.	The leaves are used internally for febrile ailments and applied externally on erysipelatos inflammations. A plaster made from the rhizome is applied on chronic tumors.
<i>Helminthostachys zeylanica</i> (L.) Hook.	The rhizomes are used in the treatment of syphilis, dysentery, catarrh, whooping, cough and phthisis.
<i>Ophioglossum reticulatum</i> L.	The plant is used for treating wasting diseases, arresting sexual weakness and painful micturition. It is also employed for the treatment of insanity.
<i>Palhinhaea cernua</i> (L.) Franco & Vasc.	A decoction of the plant is given for coughs and as a diuretic. It is effective for dysentery, gout and rheumatism. An embrocation of the ashes of the plant with vinegar is recommended for eruption.
<i>Phlegmariurus phlegmaria</i> (L.) Holub	Used in the preparation of medicinal oil for the treatment of snakebite.
<i>Phlegmariurus squarrosus</i> (G. Forst.) A. Löve & D. Löve	Used in the preparation of medicinal oil for the treatment of snakebite (Jayaweera, 2006).
<i>Pyrrosia heterophylla</i> (L.) M.G. Price	The leaves are used as a styptic to arrest capillary hemorrhages and on eczema.
<i>Selaginella wightii</i> Hieron.	This plant is used in the preparation of medicinal oils for treatment of paralysis.

Apart from the above species, according to community members interviewed around the wet zone forests in Sri Lanka, *Acrostichum aureum*, *Actiniopteris radiata*, *Blechnopsis orientalis*, *Diplazium esculentum*, *Drynaria quercifolia*, *Lygodium microphyllum*, *Ophioderma pendula* and *Parahemionitis cordata* are used in the indigenous medicinal system.

### Food value

With very few exceptions, ferns have not been widely used as a source of food (Mannan *et al.* 2008). Although ferns have been used in traditional cuisines for a long time, information on their pattern of usage, nutritional properties, and recipes is lacking. Lie *et al.* (2012) reported that the history of eating ferns in China may go back as far as 3000 years, and edible ferns are some of the most commonly collected wild food plants around the world, with stems, rhizomes, leaves, young fronds, and shoots, and sometimes the whole plants used for food (Lie *et al.* 2012).

*Acrostichum aureum*, *Blechnopsis orientalis* (Fig. 3A) and *Diplazium esculentum* are the only known edible fern species in Sri Lanka. Except for *D. esculentum*, the other two species are locally common. In an informal discussion with community members in the buffer zone of the Kanneliya Man and Biosphere Reserve, they mentioned that immature fronds of *Nephrolepis* spp. and *Dicranopteris linearis* were used as food, both fried and in curry, by their ancestors. Yumkham *et al.* (2006) also mentioned the food value of *Nephrolepis* and *Dicranopteris* species in North East India.

### As ornamental plants

The Sri Lankan floriculture industry is dominated by exotic species, particularly foliage plants, even though the country is home to many attractive indigenous species. Only a few genera of pteridophytes (e.g. *Adiantum*, *Nephrolepis*, and *Rumohra*) are occasionally exported as ornamental foliage plants (Export Development Board, 2011). All these are however exotic species, and none of the Sri Lankan species are popular in the local and international ornamental industry. A list of potential ornamental pteridophyte species has been published by Ranil *et al.* (2005) while discussing their potential for the Sri Lankan floriculture industry. Table 4 shows Sri Lankan species occasionally used in landscaping. Because most of the attractive and potential species are legally protected by the Fauna and Flora Protection Ordinance, they cannot be cultivated or commercialize without getting proper approval from authorizing agencies. For example, although tree ferns are ideally matched with landscaping models (Fig. 3D & 3E) all species are protected by a number of acts and ordinances.

Table 4. Species used in landscaping.

Species	Application
<i>Acrostichum aureum</i> L.	Cultivate in and around ponds and indoor waterfalls.
<i>Alsophila walkerae</i> (Hook.) J. Sm.	An endemic species used in landscaping.
<i>Angiopteris crassipes</i> Wall. ex C. Presl.	Cultivate around ponds.
<i>Angiopteris helferiana</i> C.Presl.	Cultivate around ponds.
<i>Asplenium nidoides</i> Fraser-Jenk. & Kandel	Commonly used epiphytic fern.
<i>Blechnum occidentale</i> L.	Cultivate around ponds.
<i>Doodia caudata</i> (Cav.) R.Br.	Used as bed plants only in high altitude areas.
<i>Doodia dives</i> Kunze	Used as bed plants only in high altitude areas.
<i>Doodia squarrosa</i> Colenso.	Used as bed plants only in high altitude areas.
<i>Doodia media</i> R. Br.	Used as bed plants only in high altitude areas.
<i>Drynaria quercifolia</i> (L.) J.Sm.	Commonly used epiphytic fern.
<i>Nephrolepis biserrata</i> (Sw.) Schott	A common bed plant.
<i>Nephrolepis cordifolia</i> (L.) C. Presl	A common bed plant.
<i>Nephrolepis falciformis</i> J. Sm.	A common bed plant.
<i>Nephrolepis brownii</i> (Desv.) Hovenkamp & Miyam.	A common bed plant.
<i>Phlegmariurus phyllanthus</i> (Hook. & Arn.) R.D. Dixit	A rare epiphytic fern.
<i>Phlegmariurus squarrosus</i> (G. Forst.) A. Löve & D. Löve	A rare epiphytic fern.
<i>Pityrogramma dealbata</i> (C. Presl) R.M. Tryon	A rare epiphytic fern.
<i>Pyrrosia heterophylla</i> (L.) M.G. Price	A common epiphytic fern.
<i>Pyrrosia gardneri</i> (Mett.) Sledge	A rarely used endemic epiphytic fern species.
<i>Phlegmariurus phlegmaria</i> (L.) Holub	A rare epiphytic fern.
<i>Selaginella cochleata</i> (Hook. & Grev.) Spring	A rarely used bed plant.
<i>Sphaeropteris crinita</i> (Hook.) R.M. Tryon	A tree fern species used in high altitude areas.

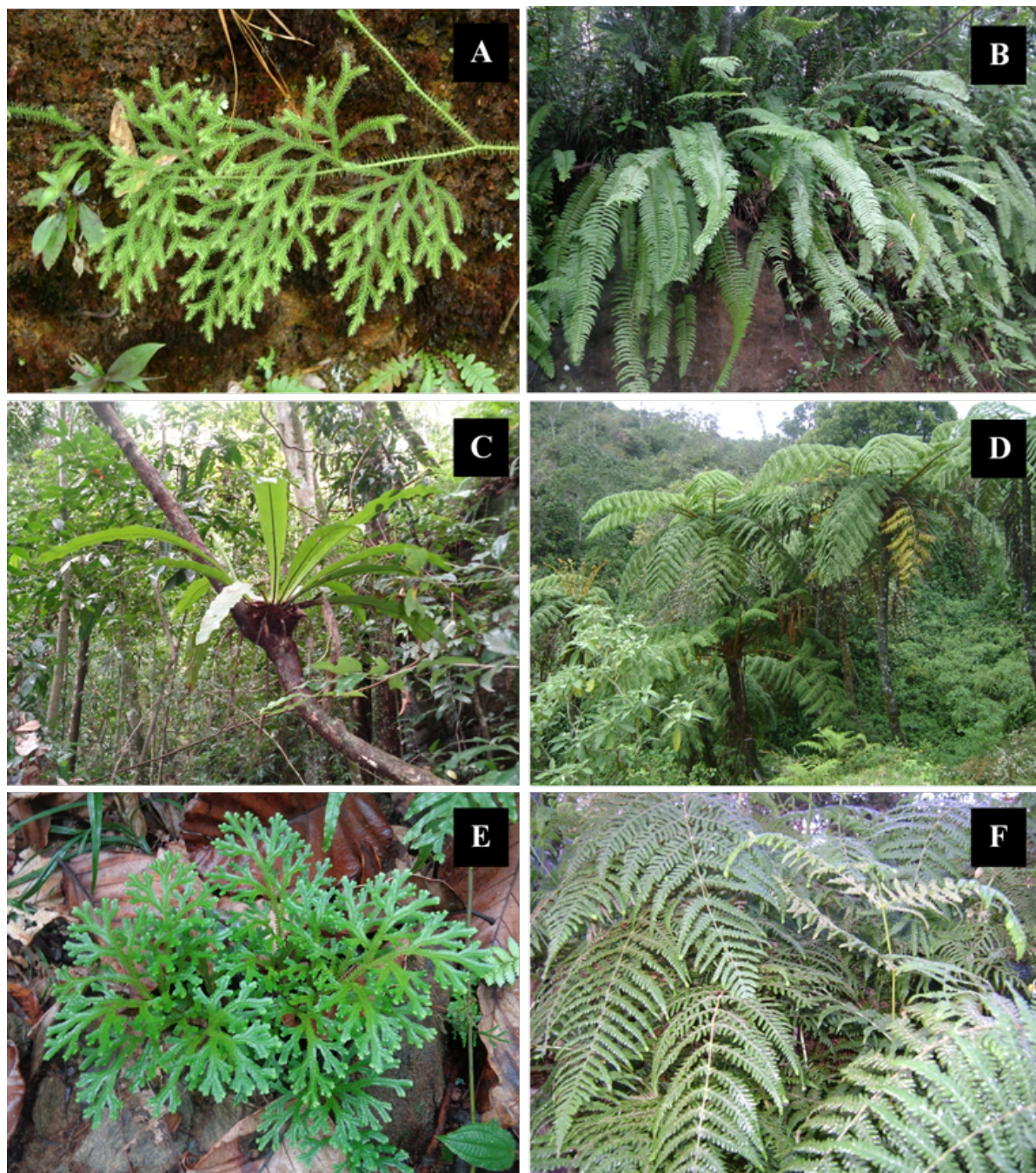


Figure 2. Species used by local community. A. *Palhinhaea cernua*; B. *Nephrolepis falciformis*; C. *Asplenium nidoides*; D. *Sphaeropteris crinita*; E. *Selaginella cochleata*; F. *Pteridium revolutum*.

### Agricultural importance

Sri Lanka is predominantly an agricultural country and is home to highly diverse agricultural ecosystems and important crop genetic resources. Until the introduction of the technology package of the green revolution in the 1960s, traditional knowledge helped our ancestors to keep the country agriculturally sustainable (Ranil *et al.* 2021b). Local farmers long maintained a sustainable agricultural production system in the country. With the expansion of modern agricultural knowledge and technological practices, many of such indigenous techniques have become underutilized and neglected. For example,

*Azolla pinnata* R.Br. subsp. *asiatica* R.M.K. Saunders & K. Fowler was already used as nitrogen source for paddy cultivation in the past (Kulasooriya 1984) which significantly contributed to reduce the amount of synthetic nitrogen fertilizer needed for paddy cultivation in Sri Lanka. Although *Salvinia molesta* D. Mitch. is alien invasive species (Wijesundara 2010), traditional farmers now have replaced *Azolla* with *Salvinia* to make organic fertilizer in their farmlands.

The plantation crop sector, particularly tea (*Camellia sinensis* (L.) Kuntze), is a key contributor to the Sri

Lankan economy in terms of foreign exchange earnings, employment, and food supply (Gunathilaka *et al.* 2017). In tea cultivation it is essential to provide temporary shade for nursery plants until they are of transplanting age. In small holding tea plant nurseries, farmers are commonly using *Dicranopteris linearis* and *Dicranopteris taiwanensis* to provide temporary shade for tea plants, and *Pteridium revolutum* is also used sometimes for the above purpose.

There is also a high demand for both wild and cultivated orchids in the floriculture industry in Sri Lanka. Small scale orchid growers use logs or pieces of the stem of tree ferns, particularly *Alsophila walkerae* and *Sphaeropteris crinita* as growth medium for orchids, although both species are protected under the fauna and flora protection ordinance of Sri Lanka.

Ferns are not always beneficial organisms, and although fern invasions have not gained massive publicity their effects on the environment cannot be overlooked (Akomolafe & Rahmad 2018). Although more than 157 species in the world have been registered as alien weeds, of which 39% behave as invasive species (Jones *et al.* 2019), and a variety are toxic to animals and humans (Siman *et al.* 2000). Especially in the dry and intermediate zones of Sri Lanka, the farming community is struggling with problems created due to invasion of water bodies by *Salvinia molesta*, a fast-spreading invasive alien species in Sri Lanka (Wijesundara 2010). Though several attempts were made to control it over the last few decades, *S. molesta* still remains one of the most troublesome aquatic weeds. In tea plantations, *Plebhodium aurium* is naturalized and usually found on tea bushes as a weed. *Adiantum hispidulum* Sw. and *Christella dentata* (Forssk.) Brownsey & Jermy are other common weeds in upcountry tea plantation.

#### Uncommon uses

Apart from their main uses (food, medicine and ornamental) some pteridophyte species are used by the local communities to fulfill some other needs. The stems of *Alsophila walkerae* are often used to provide support for the climbing of betel vine (*Piper betle* L.). The stems are also burnt as light source (personal communication with elders in the buffer zone of Kanneliya Forest Reserve.) and the species is also used as firewood and for making fences, instead of wooden poles (Fig. 3F).

*Palhinhaea cernua* is a locally common species usually growing on roadsides and disturbed forest areas. It use as a bedding material and also used in floral decorations (Ranil *et al.* 2014). We also observed that scaly leaves of *Drynaria quercifolia*

being used in dry floral decorations. Children use the dry fronds of *D. quercifolia* to make kites. Both *Lygodium flexuosum* and *Lygodium microphyllum* find use as rope, when making bundles of leafy vegetables and firewood, and also are used in floral decorations (Fig. 3C). During the constructions of dams for small scale irrigation channels, thick layers of *D. linearis* are used to block the water flow temporary. In gem mines, *D. linearis* is used as filler to block the leaching of water into the mine.

## Conclusions

Here we compiled all available ethnopteridological information of Sri Lankan pteridophytes. It is evident that although a considerable number of Sri Lankan pteridophyte species have potential as food, medicinal and ornamental species, they still remain underutilized and neglected crop genetic resources. All species and their associated knowledge are at risk, and highly vulnerable due to an ever faster changing physical environment, increasing population pressure, and rapid socio-economic development. Collection and documentation of such information are highly needed, because most of the information is still in the hand of the local community without any written documentation. Collection, conservation, and utilization of ethnopteridological knowledge might be effectively used to improve the country's development and conservation.

## Declarations

**List of abbreviations:** Not applicable.

**Ethics approval and consent to participate:** Before conducting interviews, prior informed permission was obtained from all stalk holders. No further ethics approval was required.

**Consent for publication:** This paper does not include any individual person's data and further permission for publication is not required.

**Availability of data and materials:** The data was not deposited in public repositories.

**Conflict of interests :** The authors declare that they have no competing interests.

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**Authors' contribution:** The first author collected, analyzed, and interpreted the information. The second author improved and edited the first draft. Both authors read, reviewed, and approved the final version of the manuscript.

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Figure 3. Some uses of pteridophytes in Sri Lanka. A. just after harvesting of immature frond of *Blechnum orientale* for cooking; B. luxury gown *Phlegmariusus phyllanthus* in a homegarden; C. use of *Lygodium flexuosum* in a decoration; D. an endemic *Alsophila walkerae* used in landscaping; E. *Sphaeropteris crinita* used in landscaping; F. stems of *Alsophila walkerae* used to make fences around rural houses; G. fleshy and rounded leaves of *Pyrrosia heterophylla*.

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