International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: SJIF: 5.995
Available Online at www.journalijcar.org
Volume 6; Issue 12; December 2017; Page No. 8484-8488
DOI: http://dx.doi.org/10.24327/ijcar.2017.8488.1371

Research Article

ECONOMICALLY USEFUL PTERIDOPHYTES FROM VAGAMON KURISUMALA, KERALA

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ARTICLE INFO

Article History:
Received 12th September, 2017
Received in revised form 5th October, 2017
Accepted 4th November, 2017
Published online 28th December, 2017

Key words:
Pteridophytes, medicinal, ornamental, edible ferns.

ABSTRACT

Intensive field study was carried out inVagamon Kurisumala to document the economically useful Pteridophytes. The study had resulted in the documentation of 28 species of economically important Pteridophytes belonging to 16 families and 23 genera. Out of the collected plants, 26 species are medicinal, 17 species are ornamental and two species are edible. Analysis of the families shows that Pteridaceae is the dominant family with four species.

INTRODUCTION

Pteridophytes may comprise a significant component of the forest ecosystem. Ferns have measurable indications that may reflect the effects of change in environmental factors. The ferns are not only taxonomic oddities but those are plants with dynamic relationship to their environment (Verma and Khullar, 2010). Pteridophytes are of immense economic importance and there is a great need for their exploitation towards the economic utility in daily life (Benjamin and Manickam, 2007). Botanical explorations should increase in the under-explored botanically rich areas of the Western Ghats, especially in Kerala, for documenting the pteridophytic wealth of the area and to understand the diversity and economic utility of this wonderful group of plants.

The present study was conducted in Kurisumala hills of Vagamon, a relatively remote hilly area, and a lovely hill station in South India. It is a sparsely populated region comprising mostly of natural landscape of a diverse nature. This beautiful grasslands falls within the Western Ghats, is rich in endemic flora and fauna, and has been identified as a biodiversity 'hotspot'. Kurisumala (mountain of the holy cross) is located at the fringe of the Western Ghats, at about 60 km from Kottayam and 65 km from Idukki in Kerala, situated at an elevation of about 1100 m above the msl (Mathew *et al*., 2014).

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MATERIALS AND METHODS

Intensive field explorations were carried out in Vagamon Kurisumala during the years 2014-2016, to document and collect the Pteridophytes. Standard universally accepted methods of field work and herbarium techniques have been followed (Jain and Rao, 1977). The species identity were checked and verified with the help of illustrations and Flora (Beddome, 1864; Manickam and Irudayaraj, 1992). The economically useful plants were also listed out.

RESULTS AND DISCUSSION

The present study in Vagamon Kurisumala had resulted in the documentation of 28 species of economically important Pteridophytes belonging to 16 families and 23 genera (Table 1). Out of the collected plants, 26 species are medicinal, 17 species are ornamental and two species are edible (Fig. 1).

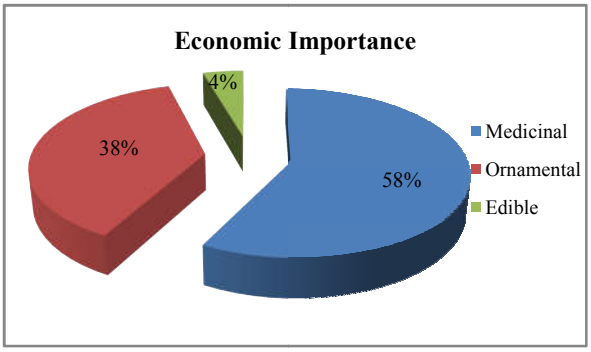

Fig 1 Economic importance of Pteridophytes from VagamonKurisumala

Among the recorded families, Pteridaceae is the dominant one with four species, followed by Selaginellaceae and Polypodiaceae with three species each (Fig.2).

Table 1 Economcally important Pteridophytes from Vagamon Kurisumala

Sl. No:	Name of the species	Family	Economic Importance	Medicinal application/Uses	References
1	*Huperzia hamiltonii* (Spreng) Trev.	Lycopodiaceae	Medicinal	Shows antibacterial properties and can be used in the treatment of diseases caused by bacteria.	Maridass and Raju, 2009
2	*Lycopodiella cernua* (L.) Pic. Serm.	Lycopodiaceae	Medicinal, Ornamental	A decoction of the plant is used as a lotion in beri-beri and also for coughs and uneasiness in the chest. An embrocation of the ashes in vinegar is recommended for skin eruptions. It is also cultivated as an ornamental plant	Manickam and Irudayaraj, 1992
3	*Selaginella delicatula* (Desv.) Alston	Selaginellaceae	Medicinal, Ornamental	Plant juice is antibacterial and is used for healing off wounds by the tribals. Potential ornamental plant for its attractive fronds.	Pratibha *et al*., 2011; Singh *et al*., 2011; Priya *et al*., 2014
4	*Selaginella involvens* (Sw.) Spring	Selaginellaceae	Medicinal, Ornamental	Plant is considered to help to rejuvenate life, also used in the prolapsed of rectum, prevents cough, bleeding piles, gravel amenorrhea and it has antibacterial properties. Potential ornamental plant due to its attractive fronds and sporophylls.	Singh, 1999; Manandhar, 1996; Priya *et al*., 2014
5	*Selaginella tenera* (Hook. & Grev.) Spring	Selaginellaceae	Medicinal	Diuretic and used in gonorrhoea diseases	Maridass and Raju, 2010
6	*Angiopteris evecta* (Forst.) Hoff.	Marattiaceae	Medicinal, Ornamental, edible	Leaf extract is used in the treatment of dysentery. Spores are effective in the treatment of leprosy and other skin diseases. Rhizomes are used against scabies. It is also cultivated as ornamental. Rhizome is cooked and eaten by the tribals of Assam. They also made an intoxicating drink, *ruchshi* from it. Stem is widely used as a base for transporting orchids.	Kirtkar and Basu, 1935; Dixit and Vohra, 1984; Mathew *et al*., 1996; Vasudeva, 1999
7	*Dicranopteris linearis* (Burm. f.) Underwood	Gleicheniaceae	Medicinal	Fronds used for Asthma. Fluid extracted from the fronds show antibacterial properties. Young Fronds with Cow's milk given in Woman's sterility. The rhizomes are used as anthelmintic.	Asolkar *et al*., 1992; Manickam and Irudayaraj 1992; Vasudeva, 1999; Revathi *et al*., 2013
8	*Cyathea gigantea* (Wall. ex Hook.) Holttum	Cyatheaceae	Medicinal, Ornamental	Fronds are anti-inflammatory and rhizome is used in snake bite. Cultivated in botanical gardens as ornamental plants.	Vasudeva, 1999; Singh, 2003
9	*Odontosoria chinensis* (L.) J. Sm.	Lindsaeaceae	Medicinal, Ornamental	Leaves are used internally for chronic enteritis in Mauritius. This is a beautiful ornamental fern with thin fronds, suitable for hanging baskets.	Dixit and Vohra, 1984; Manickam and Irudayaraj 1992; Revathi *et al*., 2013
10	*Microlepia speluncae* (L.) T. Moore	Dennstaedtiaceae	Medicinal	Leaves are used in fever and insanity.	Singh, 2003
11	*Pteridium aquilinum* (L.) Kuhn	Dennstaedtiaceae	Medicinal, Ornamental, Edible	Rhizome is astringent, anthelmintic and is useful in diarrhoea and for the treatment of inflammation in the gastric and intestinal mucous membranes. Decoction of rhizomes and fronds is given for chronic disorders of viscera and spleen. Rhizome boiled in oil and made into an ointment is used for healing wounds. Fronds are reported to be poisonous and sometimes fatal to the grazing animals. The dried fronds are employed as packing material. Tender fronds are used as vegetable and for soup; whole plant is used as insect repellent. This plant is also used as a fire indicator.	Dixit and Vohra, 1984; Manickam and Irudayaraj, 1992; Singh, 2003; Revathi *et al*., 2013
12	*Adiantum lunulatum* Burm.	Adiantaceae	Medicinal, Ornamental	Leaf and root decoction is used for the treatment of chest complaints. The rhizome powder is used as antidote against snake bite. The whole plant is ground into a paste with turmeric and applied over the affected places to treat pimples and wounds. This beautiful fern with black wiry stem is ornamental and suitable for growing as pot plant..	Thulsi *et al*., 2007; Singh *et al*., 2011; Sonia, 2012; Revathi *et al*., 2013
13	*Adiantum raddianum* C. Presl	Adiantaceae	Medicinal, Ornamental	Whole plant is used in cough, asthma, fever, leprosy and hair falling. Potential ornamental plant due to its attractive fronds.	Revathi *et al*., 2013; Priya *et al*., 2014
14	*Cheilanthes farinosa* (Forssk.) Kaulf.	Pteridaceae	Medicinal	Roots are used to treat eczema and stomachache, fronds are used to treat menstrual disorders. The paste of fronds and rhizomes along with *turmeric* is applied for skin diseases.	Thulsi *et al*., 2007
15	*Cheilanthes tenuifolia* (Burm.) Sw.	Pteridaceae	Medicinal, Ornamental	Tribals use rhizome and root extracts as a general tonic. The juice obtained from the leaves is mixed with hot water and taken orally along with honey to treat throat pain. Plant with small,green attractive fronds and black brittle stipe is best suitable for rockeries.	Dixit, 1974; Revathi *et al*., 2013
16	*Parahemionitis cordata* (Roxb. ex Hook. &Grev.) Fraser-Jenk.	Pteridaceae	Medicinal, Ornamental	Leaf extract is applied to centipede bite and wounds. This attractive dwarf fern is commonly known as "Rabbit's ear fern". Cultivated as ornamental plants due to their beauty and grace and is ideal for rockeries.	Vasudeva, 1999; Sonia, 2012; Revathi *et al*., 2013
17	*Pityrogramma calomelanos* (L.) Link. var. *aureoflava* (Hook.) Weath.	Pteridaceae	Ornamental	Commonly known as "Golden fern". This beautiful fern can be grown as a potted plant in indoors. Fronds are much attractive with the golden-yellow powder beneath it.	Sonia, 2012
18	*Asplenium hindusthanensis* Bir	Aspleniaceae	Ornamental	Potential ornamental plant due to its good looking habit and beautiful fronds.	Priya *et al*., 2014

19	*Christella dentata* (Forssk.) Brownsey & Jermy	Thelypteridaceae	Medicinal, Ornamental	Plant is used for the treatment of rheumatism. Cultivated in botanical gardens.	Vasudeva, 1999
20	*Cyclosorus interruptus* (Willd.) H.	Thelypteridaceae	Medicinal	Rhizome and sporophyll have antibacterial properties	Shaikh and Chopade, 2015
21	*Blechnum orientale* L.	Blechnaceae	Medicinal, Ornamental	Fresh fronds are used as poultice for boils in Malaya; used for urinary bladder complaints in India and Polynesia; diaphoretic, and aromatic in Philippines. Rhizome is used as anthelmintic in China and as cure for intestinal wounds. Cultivated as ornamental in gardens.	Dixit and Vohra, 1984; Vasudeva, 1999
22	*Dryopteris cochleata* (Buch.-Ham. ex D. Don) C. Chr.	Dryopterdiaceae	Medicinal	Whole plant extract is given twice daily orally in case of snakebite. Plant paste is also applied on the bite wound to prevent infection. The rhizome is antibacterial and antiepileptic. A small portion of powdered rhizome is taken with water twice daily in rheumatism, epilepsy and leprosy. Root juice twice a day before meal is given to treat amoebic dysentery.	Singh, 1999; Verma and Singh, 1995; Manandhar, 1996
23	*Nephrolepis auriculata* (L.) Trimen	Lomariopsidaceae	Medicinal, Ornamental	Decotion of the fresh frond given in cough. Commonly cultivated in gardens as ornamental plant and as potted plants for indoor decorations due to its attractive fronds.	Manickam and Irudayaraj, 1992; Vasudeva, 1999; Revathi *et al*., 2013
24	*Tectaria coadunata* (J. Sm.) C. Chr.	Tectariaceae	Medicinal	Plant is antibacterial; used in asthma, bronchitis, stings of honeybee. Fresh rhizome extract is used for preventing diarrhoea in children in Darjeeling district. Cooked tender portion is used for curing stomach trouble. Plant decoction useful in colitis.	Dixit and Vohra, 1984; Singh, 1999; Manandhar, 1996; Pratibha *et al*., 2011
25	*Tectaria wightii* (Clarke) Ching	Tectariaceae	Medicinal	Rhizome is anthelmintic. The decoction thus obtained is taken orally twice a day to cure asthma.	Dixit and Vohra, 1984; Manickam and Irudayaraj 1992; Revathi *et al*., 2013
26	*Drynaria quercifolia* (L.) J. Sm.	Polypodiaceae	Medicinal, Ornamental	Rhizome is bitter, it is used as antibacterial, anodyne, constipating, anti inflammatory, tonic, in the treatment of typhoid fever, phthisis, dyspepsia, cough, arthralgia, cephalalgia, diarrhoea, ulcers and other inflammations. It is very specific in the treatment of migraine. Fronds are used against swellings. The aqueous extracts possess antibacterial properties. Commonly known as "Oak leaf fern". Grown as ornamentals in gardens as epiphytes or as indoor plant due to its attractive fronds and sori. Good for hanging baskets.	Dixit and Vohra, 1984; Warrier, 1996; Vasudeva, 1999; Sonia, 2012
27	*Microsorum punctatum* (L.) Copel.	Polypodiaceae	Medicinal	Leaf and juice are used as purgative, diuretic and for healing wound	Benjamin and Manickam, 2007
28	*Pyrrosia porosa* Hovenkamp	Polypodiaceae	Medicinal	The whole plant paste is applied over cuts made through knives.	Revathi *et al*., 2013

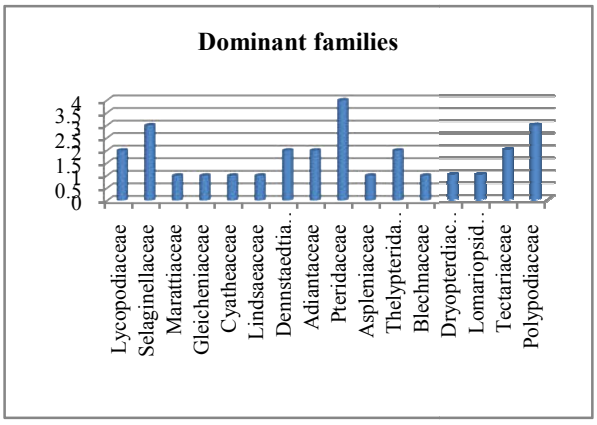

Fig 2 Analysis of dominant families

Images of few of the economically useful Pteridophytes are given in Fig. 3 and Fig. 4.

Medicinal

There are 26 species occurring in Kurisumala are medicinally useful. Some of the medicinally important species are *Blechnum orientale* L., *Dryopteris cochleata* (Buch.-Ham. ex D. Don) C. Chr., *Drynaria quercifolia* (L.) J. Sm., *Dicranopteris linearis* (Burm. f.) Underwood, *Cyathea gigantea* (Wall. ex Hook.)Holttum, *Odontosoria chinensis* (L.) J. Sm., *Pteridium aquilinum* (L.) Kuhn, *Adiantum lunulatum* Burm., *Tectaria coadunata* (J. Sm.) C. Chr., *Selaginella involvens* (Sw.) Springetc.

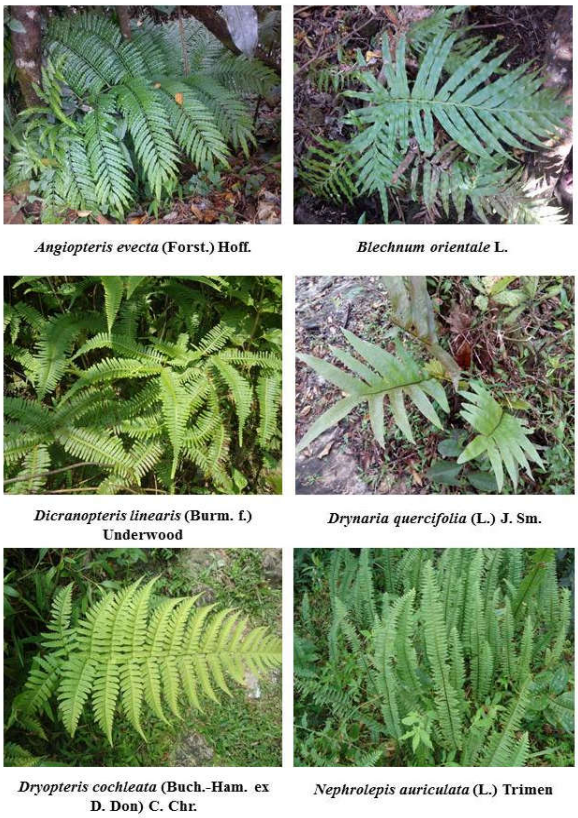

Fig. 3 Economically useful Pteridophytes from Vagamon Kurisumala

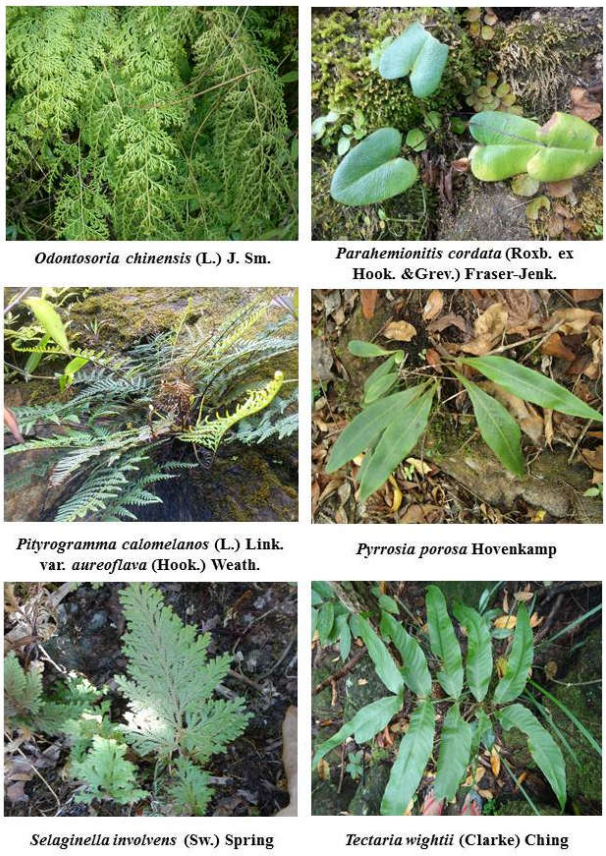

Fig 4 Economically usefulPteridophytes from VagamonKurisumala

Edible

Angiopteris evecta (Forst.)Hoff., *Pteridium aquilinum* (L.) Kuhn etc. are the two edible Pteridophytes reported from the study area.

Ornamental

Ferns have got great aesthetic value for their elegant fronds and a large number of them are cultivated as ornamental plants in houses and botanic gardens (Sonia, 2012). Some of the ornamental potential species reported are *Nephrolepis auriculata* (L.) Trimen, *Drynaria quercifolia* (L.) J. Sm., *Parahemionitis cordata* (Roxb. ex Hook. & Grev.) Fras. Jenk., *Pityrogramma calomelanos* (L.) Link. var. *aureoflava* (Hook.) Weath. ex Bailey, *Blechnum orientale* L., *Adiantum lunulatum* Burm., *Odontosoria chinensis* (L.) J. Sm., *Selaginella delicatula* (Desv.) Alston, *Selaginella involvens* (Sw.) Spring etc."

CONCLUSION

Pteridophytes are easily vulnerable to human interactions due to their susceptibility and lack of adaptiveness to even the slightest environmental disturbances. Since it is a tourist spot and pilgrim centre, the Pteridophytes of Vagamon Kurisumala facing serious threat due to anthropogenic pressures and biotic interference. Hence, more studies are required in future for developing in situ conservation strategies for this wonderful and economically important group of plants.

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How to cite this article:

Sonia Abraham and Nisha Dennis (2017) 'Economically Useful Pteridophytes From Vagamon Kurisumala, Kerala', *International Journal of Current Advanced Research,* 06(12), pp. 8484-8488.
DOI: http://dx.doi.org/10.24327/ijcar.2017.8488.1371

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