

Ethnomedicinal Use of Pteridophyte from Kolli Hills, Namakkal District, Tamil Nadu, India

G. Perumal

Department of Zoology, School of Life Sciences, Bharathiar University,
Coimbatore - 46, Tamil Nadu, India
Email: gperumal_12@yahoo.co.in

Issued: February 01, 2010

Abstract

The study enumerates the Pteridophytes widely used by the local people and tribes in the treatment of various diseases in Kolli hills of Namakkal district. They grow in terrestrial, epiphytic and lithophytic habitat. The present study deals with the ethnomedicinal uses of available Pteridophytes plants which are prevalent in study area, along with botanical name, family, habitat, plant part used and mode of uses.

Key words : Ethnomedicine, Pteridophytes, Kolli hills, Medicinal properties.

Introduction

Pteridophytes are the seedless vascular cryptogams which occupy a position between the lower non-seed bearing and higher seed bearing plants from generally much neglected group of plants. About 250 millions years ago, they constituted the dominant vegetation on earth surface. However, they are now replaced by seed bearing plants in the modern day flora. Pteridophytes grow luxuriantly in moist tropical and temperate forest and their occurrence in different eco-geographically threatened regions from sea level to the highest mountain are of much interest. About 12, 000 species of Pteridophytes occur in the world flora of which about more than 1,000 species into 70 families and 191 genera likely to occur in India (Dixit, 1984). Recent studies shows that roughly 270 fern species found in south India, about 10 percent of the region. Fern flora occupies the forest floor, on tree trunks and branches, in the niche of rock.

The ferns had an important role in folklore medicine. These plants have been successfully used in

the different systems of medicines like Ayurvedic, Unani, Homeopathic and other systems of medicines. Kirtikar *et al.* (1935) have described 27 species of ferns having varied medicinal uses. Chopra *et al.* (1956) have included 44 species and Nadkarni (1954) recorded 11 species of Pteridophytes having medicinal importance. Nayar (1959) recorded 29 medicinal ferns. May (1978) published a detailed review of the various uses of ferns and listed 105 medicinal ferns. In a recent compilation, Singh (1999) reported 160 species of useful Pteridophytes in India on the basis of phytochemical, pharmacological and ethnobotanical studies.

A systematic survey of the antibiotic activity of Pteridophytes, however has been scarcely undertaken. The antimicrobial potential of some ferns has been studied (Kumar and Kaushik, 1999; Parihar and Bohra, 2002a & b, 2003). With this background experiments were done to assess the antibacterial activities of certain ferns.

Out of 1,000 species of Pteridophytes occurring in India, 170 species have been found to be used as food, flavor, dye, medicine, bio-fertilizers, oil, fiber and bio-gas production (Manickam and Irudayaraj, 1992). The medicinal value of Pteridophytes against bacteria, fungi, virus, cancer rheumatism, diabetes, inflammation, consultant, fertility, diuretic, pesticides, hepatoprotective, and sedative had been reported. Besides sugar, starch, proteins and amino acids, ferns contain a variety of alkaloids, glycosides, flavonoids, terpenoids, sterols, phenols sesquiterpens etc. as potential components used in various industries (Kulandairaj and John de Britto, 2000).

In comparison to higher plants they have found little applications in medicine. The tribal communities, ethnic groups and folklore throughout the world are utilizing their plant parts like rhizome, stem, fronds, pinnae and spore in various way for the treatment of various ailments since ancient time.

The number of contributors about the taxonomy, ecology and distribution of Pteridophytes have been published from time to time but enough attention has not been paid towards their useful aspects. An attempt has been made to explore indigenous and ethnomedicinally important Pteridophytes and properly document their useful aspects.

Young leaves of the ferns *Diplazium esculentum* (Retz.) Sw., *Helminthostachys zeylanica* (L.) Hook, *Nephrolepis cordifolia* (L.) Presl and *Stenochlaena palustris* (Burm.) Bedd. are cooked as vegetables by the tribals in Indian mountains. *Azolla pinnata* R.Br. is used as rice fertilizer and chicken feed. In the case of water fern *Marsilea drummondii* the starchy paste of the sporocarps is made in to cakes called “Nardoo” and is eaten by the natives of Australia.

Only few Pteridophytic plants are used as medicine eg. Paste of tubers of *Nephrolepis auriculata* (Linn.) Trimen is used to lower down the brain fever and headache by applying locally. The vegetable of the Croziers of different species of *Diplazium* Sw. is known to be of laxative nature and often used to

treat colitis and constipation. *Selaginella bryopteris* Linn. Bak is considered as highly useful in unconsciousness, the decoction aerial leafy sporophyte is used to regain vigor. Similarly *Heminthostachys Zeylanica* (Linn) Hook. is used to revert the impotency. The paste of *Adtinatum incisum* Forssk. and *A. venustum* is useful in the healing of wounds (Samant *et al.*, 1998; Kholia and Punetha, 2005).

Quite a number of ferns and fern allies are of great medicinal value, among them mention may be made of *Equisetum arvense* Linn. This is used in nasal polyps and kidney infections, ashes useful in acidity. *E. debile* Roxb, is diuretic and given in gonorrhoea. *Lycopodium clavatum* Linn., in the form of decoction used in rheumatism and diseases of lungs and kidneys. The paste of the leaves of *Ophioglossum reticulatum* Linn., is used in headache. *Botrychium virginianum* Sw. is used in dysentery. *Helminthostachys zeylanica* (Linn.) Hook. is used for vitality and brain tonic. *Lygodium flexuosum* (Linn.) Sw., is an expectorent and used in ulcers, cutwounds and sprains. The fronds of the gleicheniaceous fern *Dicranopteris linearis* (Burm.) underwood are used for asthma and in woman's sterility. The plants of the 'royal fern' *Osmunda regalis* Linn. are stypic and tonic. The rhizomes of *Angiopteris evecta* (Forst.) Hoffm. are used for scabies (Vasudev, 1999).

About 150 ferns and fern allies have been collected from the Eastern Ghats of Yercaud, Kolli Hills and Pachamalai by Manickam and Irudayaraj (1992). At present a resurvey of the pteridophytic flora is required to study the distribution and ecology of the Pteridophytes in the Kolli Hills, because vast forest areas are being under disturbance mainly for the purpose of cultivation. In the present study, an intensive survey was made over a period of 12 months from February 2004 to February 2005 with the medicinal usage of collected plants. To list out the different ferns and fern allies from the Kolli hills.

Study Area

Kolli Hills of Eastern Ghats lies in Namakkal District; Tamil Nadu is well known for its rich biological diversity. It has a total area of 490 km². A Kolli hills is flanked by Namakkal Taluk on the south and south west, Rasipuram on the north and north east, Attur Taluk is on the north east and Trichy district in the east. The altitude ranges from 1000 – 1400 m rising to 1450 m at Kuzhivalavu (11 10- 30 N and 75 15 -75 30 E). Kollimalai is called as Chaturagiri or Square hill contain of high rising peaks and ravines. Slopes are quite steep forming several narrow and deep valleys and in some places rising abruptly from plains and generally steep near ridges. Kolli hills is drained by two rivers, Vasisthanadhi and Swetanadhi. Swetanadhi originates from Kolli hills and drains the northern side of Salem district. Vasisthanadhi is called as Pearar and originates from the Aranuttmalai, turns eastwards and which is an irrigation resource to Attur Taluk. Kolli Hills is an isolated hill range of the discontinuous Eastern Ghats mountain system situated in the Namakkal district of Tamil Nadu. Kolli Hills (Kolli Hills in Tamil Nadu) has an area of 282.92 sq.km. It stretches around 29 km north to south and 19 km east to west.

Kolli Hills on the western, eastern and southern sides rise abruptly from the plains and are thickly forested. The northern sides descend to the plains by gentle slopes, and remostly under agriculture.

Materials and Methods

In the present study an intensive survey was made field survey in various places namely, Solakkadu, Semedu area, Kuzhivalavu shola, Nachiyar kovil, Arapallieswarar Kovil and Sengari shola in Kolli hills.

During the course of survey ferns and ferns allies were collected and the herbarium was made. All the specimens were compared and identified with the standard herbarium available in St. Xavier's College, Palayamkottai- Tirunelveli. The voucher specimens were kept and preserved in Kandaswami kandar's College, Velur.

Results and Discussion

This survey observed nearly 10 species of Pteridophytes from the area are enumerated with botanical name, family, popular name, parts used and medicinal uses in Table-1

BRACKEN FERN

Family: Dennstaedtiaceae

Genus: *Pteridium*

Species: *aquilinum* (L.) Kuhn,

Rhizome long creeping, subterranean, densely covered by about 5mm long, pale brown, multicellular. Stipes scattered, dark brown to black and hairy at the base, pale brown to stramineous and glabrous above, abaxially rounded, adaxially grooved. Lamina deltoid-ovate, acute, broadly cuneate, tripinnatifid at the base, primary pinnae about eight pairs, opposite or subopposite, ascending, largest primary pinna up to 60×30cm, ovate-lanceolate, acuminate, secondary pinnae up to 12 pairs per primary pinna, alternate above, shortly stalked or subsessile, oblong-lanceolate, acuminate, pinnules up to 20 pairs per secondary pinna, alternate sessile. Sori fimbriate, reflexed margin above and thin small fimbriate membrane below (Plate).

GHORA TOP

Family: Angiopteridaceae

Genus: *Angiopteris*

Species: *evecta* (Forst) Hoff.

Rhizome erect, cylindrical and apex densely covered by dark brown hairs. Stipular at the base, abaxially

rounded, adaxially flattened, bearing whitish linear streaks all over, glabrous. Lamina deltoid, bipinnate, pinnae upto 16 pairs, sub opposite with about 3cm long stalk, oblong- lanceolate, margin serrate in the distal part of the pinnae, costa slightly raised and rounded above and below, veins distinct and slightly raised above and below. Pinnae dark green, glabrous except the occurrence of few small, pale brown, soft, textures herbaceous. Sori sub marginal, ellipsoid, sporangia upto six pairs in two rows, compact. Free spores trilete, upto 20µm in diameter, pale green, exine sparsely granulose(Plate).

MORPANKHI

Family: Actinopteridaceae

Genus: *Actiniopteris*

Species: *radiata* (Sw.) Link,

Rhizome suberect, subglobose, densely covered by scales; scales lanceolate, pale brown at the periphery, apex acuminate, pointed, margin entire. Stipes numerous, tufted. Lamina flabellate, semicircular or wedge-shaped, upto 3.5×5.5cm, dichotomously divided up to six times, segments rachiform, apex acute, margin entire; veins, obscure in mature frond, lamina pale green, texture coriaceous, soft, pale brown. Sporangia borne in intramarginal grooves throughout, protected by the reflexed margin of the segment; Spores tritete, 50×50µm, verrucate on the proximal side (Plate).

MAYOR SHIKHA

Family: Adiantaceae

Genus: *Adiantum*

Species: *caudatum* L.

Rhizome erect, densely covered by scales all over; scales lanceolate, dark brown at the centre, gradually become pale brown towards the margin, opaque, acuminate, entire. Stipes numerous, tufted, dark brown, rounded below, grooved above, pale brown, multicellular, uniseriate, slender hairs all over; fronds often proliferate; lamina oblong-lanceolate, long wiry acuminate apex, simply pinnate; pinnae about 40 pairs, alternate, sessile. Veins very slightly distinct above and below, dichotomously branched, pinnae pale green; texture herbaceous; rachis also densely covered by long and short hairs all over. Sori marginal reniform or orbicular, about 1mm in diameter; indusia densely or sparsely pubescent above (Plate).

MAIDEN-HAIR FERN

Family: Adiantaceae

Genus: *Adiantum*

Species: *capillus-veneris* L.,

Rhizome long creeping, densely clothed by lanceolate, acuminate, entire, stipes, slender, scaly at base, glossy above. Lamina bipinnate, lanceolate, base cuneate; pinnae ascending, basal two to three pairs bipinnate, up to 18 × 4 cm, upper ones pinnate, pinnules stalked, parallelogram-like, flabellate, obovate, lower edge V-shaped, entire; veins dichotomously branched, branches of the first dichotomy dark brown, the rest greenish, indusium reniform or rectangular, translucent spores trilete, 46µm in diameter, exine bearing compact leasurae (Plate).

THICKET FERN

Family: Gleicheniaceae

Genus: *Dicranopteris*

Species: *linearis* (Burm., f.) Underwood

Rhizome up to 3mm thick, densely hairy. Stipes scattered, about 60×0.25cm, grey brown, glabrous. Lamina about 40×60cm, primary branch two or three pairs, about 15cm apart, forked one or two times; secondary branches lobed or auricled; ultimate leafy branch about 20×4cm, oblanceolate, acuminate, pinnatifid up to 1-2mm to the costa, leaf segments 2×0.3cm, oblong, slightly narrowed towards notched apex, veins forked two or three times; pinnae pale green or glaucous green, almost glabrous. Sori submedian on the veinlets, consisting of about 12 sporangia per sorus; spores 35µm in diameter, pale green, exine smooth (Plate).

ASHVAKATRI

Family: Polypodiaceae

Genus: *Drynaria*

Species: *quercifolia* (L.) j. Smith

Rhizome short creeping, densely clothed by scales; scales linear-lanceolate, uniformly pale brown to dark brown, apex long acuminate, margin shallowly lobed, midrib and primary veins distinctly raised above and below, secondary and tertiary veins slightly raised above and below. Veins inter connected; stipes up to 22×0.7cm, grey-brown, abaxially rounded, adaxially grooved, narrowly winged on either side, glabrous all over. Lamina oblong, up to 77×50cm, pinnately lobed, terminated by a pinnule similar to the lateral ones, base decurrent; lobes up to 15 pairs, basal pairs much reduced; oblong-lanceolate, margin entire, pinnae pale green, glabrous, texture coriaceous. Sori seated at the juncture of vein, more or less in two rows along each primary veins, orbicular, exindusiate; spores reniform, 50×30µm, pale brown, exine finely spinulose (Plate).

WATER CLOVER

Family: Marsileaceae

Genus: *Marsilea*

Species: *minuta* L.

Rhizome long creeping, branched, subterranean, about 30cm long, green in aquatic plant, pale or dark brown in terrestrials, covered by about 5×0.25 mm, whitish, soft, slender hairs sparsely or densely all over; roots borne usually on nodes, rarely on internodes. Stipes scattered, about 1cm apart, usually green, rarely pale or dark brown, terete, glabrous or whitish few hairs as in rhizome. Leaves four, sessile, arranged at the tip of the stipe in clover leaf model, obovate or wedge shaped, base cuneate, lateral margin entire, veins distinct above and below, flabellately branched, leaves pale or dark green, glabrous with few hairs; texture thin, soft herbaceous. Sporocarps borne at the nodes in clusters alternately, five per cluster, peduncle 7×1 mm; microsporangia and megasporangia enclosed in the same sporocarp and covered by gelatinous layers; microspores yellowish-brown, globose, $40\mu\text{m}$ in diameter with distinct exine and intine; megaspores ovate, starch granules and numerous oval-shaped oil globules (Plate).

SAJIVANI

Family: Selaginellaceae

Genus: *Selaginella*

Species: *tenera* (Hook & Grev.)

Stem erect, rooting at the base only, green to pink colour when fresh, and stramineous to pink colour when dry. Leaves dimorphic throughout, continuous on main stem and on axis of primary branches, lateral leaves 3×1.5 mm, oblong-ovate, obtuse or sub acute, denticulate on the acroscopic, margin, lateral Sporophylls bear mega sporangia; others with micro sporangia, microspores brick red mass, $20\mu\text{m}$ in diameter with thick warty surface; megaspore $150\mu\text{m}$ (Plate).

KAKOLISAG

Family: Dryopteridaceae

Genus: *Dryopteris*

Species: *cochleata* (Buch.Ham.Ex D.Don)

Rhizome short creeping, densely clothed by scales all over, scales lanceolate, pale brown, thin, membranaceous, translucent, apex long acuminate, margin with tooth like or glandular hair like outgrowths or with long lateral branches. Stipes up to 32×0.5 cm, grey-brown when dry, scaly below, fronds dimorphic; lamina lanceolate, bipinnate; sterile lamina about 40×19 cm, fertile one much contracted, pinnae up to 10 pairs, ascending, shortly stalked, subopposite, pinnae pale green; texture subcoriaceous, long, soft, pale brown. Fertile pinnule up to 1.5×0.3 cm, oblong, acute, apex acute; spores dark brown, $50 \times 40\mu\text{m}$, with uniformly anastomosed and heavily thickened perispore (Plate).

Table 1: Medicinally important ferns and fern allies in Kolli Hills.

S. No	Name of the species	Popular Name	Parts used	Medicinal uses
1	<i>Actinioptiris radiate</i>	Morpankhi	Plants	Astringent, antihelmintic and styptic
2.	<i>Adiantum capillus- veneris</i>	Maiden-hair Fern	Plants	Diuretic and astringent
3.	<i>Adiantum caudatum</i>	Mayor Shikha	Plants Rhizomes	Cough and fever. Antihelmintic
4.	<i>Angiopteris evecta</i>	Ghora top	Rhizomes	Scabies
5.	<i>Dicranopteris linearis</i>	Thicket Fern	Fronds Rhizome	Asthma, women's sterility. Antihelmintic
6.	<i>Drynaria quercifolia</i>	Ashvakatri	Plants Rhizome Fronds	Hecticfever, dyspepsia, Cough and antihelmintic. Astringent Swellings
7.	<i>Marsilea minuta</i>	Water Clover	Leaves	Cough and bronchitis
8.	<i>Pteridium aquilinum</i>	Bracken Fern	Rhizomes Rhizome and fronds	Antihelmintic and astringent. Chronic disorders
9.	<i>Selaginella tenera</i>	Sajivani	Dried plants	Diuretic gonorrhoea and hallucination
10.	<i>Dryopteris cochleata</i>	Kakolisag	Rhizomes	Leprosy, antifungal, Swellings , ulcers and pains

Discussion

Pteridophytes (Ferns and Fern allies) by virtue of their possessing great variety and fascinating foliage have drawn the attention and admiration of horticulturists and plant lovers for several centuries. They are represented by about 305 genera comprising more than 10,000 species all over the world. About 191 genera and more than 1000 species are reported from India (Dixit, 1984; Bir 1992). The Pteridophytes are known to man for more than 2000 years for their medicinal values (Kirtikar et al.,

1935; Nayar 1959; Nadkarni 1954; May 1978). Chopra (1933) mentioned various Pteridophytic plants to be antimicrobial in nature.

Quite a number of ferns and ferns allies are of great medicinal value, among them mention may be made of *Equisetum arvense* Linn. This is used in nasal polyps and kidney infections, ashes useful in acidity. *E. debile* Roxb, is diuretic and given in gonorrhoea. *Lycopodium clavatum* Linn., in the form of decoction used in rheumatism and diseases of lungs and kidneys. The paste of the leaves of *Ophioglossum reticulatum* Linn., is used in headache. *Botrychium virginianum* Sw. is used in dysentery. *Helminthostachys zeylanica* (Linn.) Hook. is used for vitality and brain tonic. *Lygodium flexuosum* (Linn.) Sw., is an expectorent and used in ulcers, cut wounds and sprains. The fronds of the gleicheniaceous fern *Dicranopteris linearis* (Burm.) under wood are used for asthma and in woman's sterility. The plants of the 'royal fern' *Osmunda regalis* Linn. are styptic and tonic. The rhizomes of *Angiopteris evecta* (Forst.) Hoffm. are used for scabies (Vasudev, 1999).

Acknowledgements

The authors are thankful to management and Principal, Kandaswami Kandar's College and K. S. Rangaswamy College of Arts and Sciences, Tiruchengode, for providing laboratory facilities.

References

- Bir, S.S. 1992. Keynote address on ferns of India: their wealth exploration, diversity, growth conditions and conservation. *Indian Fern Journal* 9: 4-6.
- Chopra, R.N. 1933. *Indigenous drugs of India their economic aspects*, Calcutta Art press, Calcutta.
- Dixit, R.D. 1984. *A Gensus of the Indian Pteridophytes*. Flora of India. Series 4, Botanical Survey of India, department of Environment & forest, Government of India, Howrah.
- Kholia, B.S. and Punetha, N.N. 2005. Useful Pteriophytes of kumaon central Himalaya, India. *Indian Fern Journal* 22: 1-6.
- Kirtikar, K.R., Basu, B.O. and An I.C.S. 1935. *Indian medicinal plants*. 4 vols. (2nd ed.), Bishen Singh Mahendra Pal Singh, Dehra Dun.
- Kulandairaj, D. and John De Britto. (2000). Antibacterial and antifungal activity of secondary metabolites from some medicinal and other common plant species. *J. Eco. Taxon. Bot.*, Vol.24 :. 21.
- Kumar, A. and Kaushik, P. 1999. Antibacterial effect of *Adiantum capillus veneris* Linn. *Indian Fern J.* 16: 72-74.

- Manickam, V.S. and Irudayaraj, V. 1992. *Pteridophytic flora of the Western Ghats, South India*. BI Publications Pvt. Ltd., New Delhi, p. 653.
- May, L.W. 1978. The economic uses and associated folklore of ferns and fern allies. *Bot Rev.* 44 (4): 191-528.
- Nadkarni, B.K. 1954. *Indian Materia Medica with Ayurvedic, Unantibii, Siddha, Allopathic, Homeopathic, Naturopathic and home remedies*, Popular book depot, Bombay.
- Nayar, B.K. 1959. Medicinal ferns of India. *Bull. Nat Bot Gard. Lucknow* 29: 1-36.
- Parihar, P and Bohra, A. 2002a. Effect of some pteridophytic plant part extracts on human pathogenic bacteria *Salmonella typhi*. *Advances in Plant Sciences* 15(2): 365-367.
- Parihar, P. and Bohra, A. 2002b. Antifungal efficacy of various Pteridophytic plant parts: a study *in vitro*. *Advances in Plant Sciences* 15(1): 35-38.
- Parihar, P. and Bohra, A. 2003. Effect of some Pteridophytic plant extracts on human pathogenic bacteria – *Salmonella typhi*. *Indian Fern J.* 20: 39-41.
- Parihar, P. and Bohra, A. 2004. Antibacterial activity of *Actineopteris radiata* (Swartz.) Link. *Ad. plant Sci.* 17 (11): 567-570.
- Parihar, P., Daswani, L. and Bohra, A. 2003. Toxic effect of plant extracts of *Marsilea minuta* L. on the growth of *Staphylococcus aureus*. *Indian Fern J.* 20: 48-50.
- Samant, S.S. Dhar, U. and Palni L.M.S. 1998. medicinal plants of Indian Himalaya, Diversity, Distribution and potential value. Gyannodya Prakasha nainital, India.
- Singh, H.B. 1999. Potential medicinal pteridophytes of India and their chemical constituents. *J. of Economic and Taxonomic Botany* 23(1): 63-78.
- Vasudeva, S.M. 1999. Economic importance of Pteridophytes. *Indian Fern J.*, 16: 130-152.