

A CONTRIBUTION TO FERN FLORA OF ANAIKATTY HILLS, WESTERN GHATS, TAMIL NADU, INDIA

***L. Prakash**

*Salim Ali Centre for Ornithology and Natural History, Anaikatty, Coimbatore,
Tamil Nadu, India-641108*

**Author for Correspondence: l.prakash3@gmail.com*

ABSTRACT

This study was conducted to investigate the fern diversity of Anaikatty hills situated in Western Ghats. A systematic field survey was conducted during September 2017 and October 2019. A total of 41 species were recorded belongs to 19 families and 32 genera. Pteridaceae is the dominant family with 13 species followed by Polypodiaceae (8 spp.).

Key words: *Lithophyte, Pteridaceae, Western Ghats, Pteris, Anaikatty hills*

INTRODUCTION

Pteridophytes are the pioneer to colonize the land, the antiquity of which can be traced to some 400 million years back (Puri, 1989). They form a conspicuous element of the earth's vegetation and are important from evolutionary point of view as they show the evolution of vascular system and reflect the emergence of seed in the plants (Tryon and Tryon, 1982). The pteridophytes, which include, ferns and fern-allies, form a major part of the flora next to the angiosperms in Indian biodiversity. There are over 12000 living species of ferns and 1000 species of fern-allies in the world, of which about 1157 species of ferns and fern-allies are expected to occur in India (Fraser-Jenkins *et al.* 2016). They are mainly distributed in the Eastern Himalayas and the Western Ghats - two of the 34 global hot spots of biodiversity (Marchese, 2015).

Ferns are mostly found in moist cool environments, its abundance and richness peak at approximately 1000–2600 m above the sea level in tropical regions (Kessler *et al.*, 2001; Hemp, 2002; Watkins *et al.*, 2006). High humidity and annual precipitation in tropical forests contributes to the richness of ferns. Ferns are considered to be good climate indicators, as they prefer to grow in moist and shady habitat and uses less water to grow (Brodribb and McAdam, 2011; Brodribb *et al.*, 2009). Moving away from the equator towards higher latitudes, species richness of ferns generally decreases (Karger *et al.*, 2011). In contrast, highest fern species usually found at mid-elevations (Bhattarai *et al.*, 2004; Grytnes and Beaman, 2006; Hemp, 2002; Kessler *et al.*, 2011; Tanaka and Sato, 2013; Tang *et al.* 2014). These richness patterns in ferns have mostly been interpreted by climatic factors, that the diversity is high in temperate and humid habitats, and low in cold, arid and hot habitats. Even in regions with high precipitation, increase in temperature leads to water stress in plants due to high level of evapotranspiration during rainless periods (Kluge *et al.*, 2006).

Western Ghats are one of the hotspots of fern biodiversity of the world. More than 300 species of ferns and fern-allies have been recorded from this region (Manickam, 1988). The unique physiography, mountainous terrain with narrow gorges and valleys, heavy rainfall and tropical humid climate have endowed this area to be most ideal for luxuriant plant growth (Nampy & Madhusoodanan, 1998). Chandra (1998) recognises Peninsular India as one of the eight phytogeographical regions in India that possesses about 25% of the total number of ferns endemic to India, which is highest among all these regions. Western Ghats supports 349 species out of 1100 to 1200 species of fern and fern allies in India (Manickam & Irudayaraj, 1992). The present study focuses on documentation of Ferns and its ecology in Anaikatty Hills, Western Ghats.

STUDY AREA

The study was carried out in Anaikatty hills, Coimbatore forest Division, Southern Western Ghats during September 2017 to October 2019. Anaikatty hills is situated in the part of Nilgiri Biosphere Reserve and falls between the latitudes 11° 01'N to 11° 09'N and longitudes is 76° 44'E to 76° 55'E, covering 180 sq. km. The Reserve forest is represented by several forest types such as West coast

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semi evergreen, Southern moist mixed deciduous, Southern Dry Mixed deciduous and Southern Dry deciduous forest. The study area is very rich in wildlife harbouring a good population of Asian elephants, Indian Gaur and numerous other wild fauna and flora. The climate is semi-arid as it is located in the rain shadow part of the Western Ghats. Maximum temperature varied between 28⁰ C and 36⁰ C during 1998-2001 (Nirmala, 2002). The average rainfall of Anaikatty is about 670 mm, and majority of it is from the south-west monsoon.

MATERIAL AND METHODS

Intensive field studies were carried out to record the fern species from September 2017 to October 2019. Plant specimens were collected and preserved as voucher specimens. The identification of plants was done with the help of regional floras. The taxa were identified using appropriate floras, journals, monographs and revisions (Beddome, 1864, 1865-1870, 1883-1892; Clarke 1880; Blatter *et al.*, 1922; Manickam 1986; Manickam and Irudayaraj 1992; Fraser-Jenkins 2008; Chandra, 2008).

RESULTS AND DISCUSSION

A total of 41 fern species were recorded from the Anaikatty hills in different forest types. The identified species represent 19 families and 32 genera. Pteridaceae is the dominant family with 13 species followed by Polypodiaceae (8 species). The families of Thelypteridaceae, Lycopodiaceae and Lindsaeaceae represented by two species and 14 families are represented by single species. *Pteris* is the dominant genus with 4 species, followed by *Adiantum* had 3 species. The genera *Thelypteris*, *Lepisorus*, *Hemionitis* and *Pyrrosia* accounts for two species each and 26 genera has single species. The majority of species recorded are terrestrial (21 species), followed by epiphytic (9 species), lithophytic (10 species) and aquatic (4 species).

LIST OF TAXA:

Azollaceae Wettst., Handb. Syst. Bot. 2(1): 77 (1903).

Azolla Lam., Encycl. [J. Lamarck & al.] 1(1): 343 (1783).

Azolla pinnata R.Br., Prodr. Fl. Nov. Holland. 167 (1810), subsp. *asiatica* R.M.K. Saunders & K. Fowler, Bot. J. Linn. Soc. 109(3): 349 (1992).

English Name: Mosquito fern.

Habit: Herb-Aquatic.

Habitat: Common floating aquatic; also, in rice fields, Abundant.

Fertile: August to April.

Blechnaceae Newman, Hist. Brit. Ferns, ed. 2 8 (1844).

Blechnum L., Sp. Pl. 2: 1077 (1753).

Blechnum orientale L., (sp. 2: 1077 (1753).

English Name: Centipede fern, Oriental Blechnum.

Habit: Herb-Terrestrial.

Habitat: Very common in fully exposed localities along hill roadsides.

Fertile: July to March.

Dryopteridaceae Herter, Revista Sudamer. Bot. 9: 15 (1949), nom. cons.

Bolbitis Schott, Gen. Fil. [Schott] 3: t.14 (1835).

Bolbitis semicordata (Moore) Ching in C.Chr., Index Filic., Suppl. Tert. 50 (1934).

Habit: Herb-Lithophyte.

Habitat: Found along shaded stream banks, common.

Fertile: August to March.

Notes: Endemic to Western Ghats.

Equisetaceae Michx. ex DC., Essai Propr. Méd. Pl. : 49 (1804).

Equisetum L., Sp. Pl. 2: 1061 (1753).

Equisetum ramosissimum Desf., Fl. Atlant. 2: 398 (1799).

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English Name: Scouring rush, Horsetail.
Habit: Herb-Terrestrial.
Habitat: Occasional in water logged open marshy areas, shady places.
Fertile: August-April.

Gleicheniaceae C.Presl, Reliq. Haenk. 1: 70 (1825).
Dicranopteris Bernh., Neues J. Bot. 1(2): 38 (1805).
Dicranopteris linearis (Burm.f.) Underw., Bull. Torrey Bot. Club 34: 250 (1907).
English Name: Coral fern, Old world forked fern, Scrambling ferns.
Habit: Herb-Climbing, Terrestrial.
Habitat: Very common along the roadsides in hill slopes.
Fertile: July to January.

Isoetaceae Dumort., Anal. Fam. Pl. : 67 (1829).
Isoetes L., Sp. Pl. 2: 1100 (1753).
Isoetes coromandelina L.f., Suppl. Pl. ed. 13: 447 (1782).
Habit: Herb-Aquatic.
Habitat: Grows partially submerged in water along the margins of ponds.
Fertile: November to April.
Notes: Endemic to Western Ghats.

Lindsaeaceae M.R.Schomb., Reis. Br.-Guiana [Ri. Schomburgk] 2: 883, 1048 (1848).
Lindsaea Dryand. ex Sm., Mém. Acad. Roy. Sci. Turin 5: 413 (1793).
Lindsaea ensifolia Sw., J. Bot. (Schrader) 1800(2): 77 (1801).
English Name: Sword-leaved Lindsaea.
Habit: Herb-Lithophyte.
Habitat: Common on the slopes of hills in the open or in moderately shady places.
Fertile: December to March.

Odontosoria (Pr.) Fée, Mém. Foug., 5. Gen. Filic. 325 (1852).
Odontosoria chinensis (L.) J.Sm., Bot. Voy. Herald [Seemann] 10: 430 (1857).
English Name: Lace Fern.
Habit: Herb-Terrestrial.
Habitat: Rhizomatous fern growing along the stream banks in West coast semi-evergreen forest.
Fertile: August to April.

Lycopodiaceae P.Beauv. ex Mirb., Hist. Nat. Vég. [Lam. & Mirbel] 4: 293 (1802).
Huperzia Bernh., J. Bot. (Schrader) 1800(2): 126 (1801).
Huperzia hamiltonii (Spreng.) Trevis., Atti Soc. Ital. Sci. Nat. 17(2): 248 (1875).
English Name: Tassel ferns.
Habit: Herb-Epiphyte.
Habitat: Rarely found in moist deciduous forest above 800 m elevation.
Fertile: July to March.

Lycopodiella Holub, Preslia 36: 20, (22) (1964).
Lycopodiella cernua (L.) Pic.Serm., Webbia 23: 166 (1968).
English Name: Scrambling club moss, Nodding club moss, Fairy Christmas tree.
Habit: Herb-Epiphyte.
Habitat: Occasional in West coast semi-evergreen forest.
Fertile: July-April.

Marattiaceae Kaulf., Enum. Filic. : 31 (1824).
Angiopteris (Mitchell 1748) Adans., Fam. Pl. (Adanson) 2: 21 (1763).

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Angiopteris helferiana C.Presl, Suppl. Tent. Pterid. 22 (1845).

English Name: Tree fern.

Habit: Herb-Terrestrial.

Habitat: Occasional in valleys of moist deciduous forest.

Fertile: July-February.

Marsileaceae Mirb., Hist. Nat. Vég. [Lam. & Mirbel] 5: 126 (1802).

Marsilea L., Sp. Pl. 2: 1099 (1753).

Marsilea minuta L., Mant. Pl. Altera 308 (1771).

English Name: Water-clover fern.

Habit: Herb-Aquatic or semiaquatic.

Habitat: Common in wetlands and marshy areas.

Fertile: November to March.

Nephrolepidaceae Pic. Serm., Webbia 29(1): 8 (1974).

Nephrolepis Schott, Gen. Fil. [Schott] 1: t.3 (1834).

Nephrolepis cordifolia (L.) C.Presl, Tent. Pterid. 79 (1836).

English Name: Tuberous sword fern.

Habit: Herb-Lithophyte.

Habitat: Common in wells and rocky ponds.

Fertile: August to March.

Osmundaceae Martinov, Tekhno-Bot. Slovar 445 (1820).

Osmunda L., Sp. Pl. 2: 1063 (1753).

Osmunda hugeliana C. Presl., Suppl. Tent. Pterid. 64 (1845).

English Name: Flowering fern, Green fern, Royal fern.

Habit: Herb-Lithophyte.

Habitat: Occasional in valleys of moist deciduous forest.

Fertile: August-December.

Notes: Endemic to India.

Polypodiaceae J.Presl & C.Presl, Delic. Prag. 159 (1822).

Drynaria (Bory) J.Sm., J. Bot. (Hooker) 4: 60 (1841), nom. cons.

Drynaria quercifolia (L.) J.Sm., J. Bot. (Hooker) 3: 398 (1841).

English Name: Oak-leaf fern

Habit: Herb-Epiphyte.

Habitat: Commonly epiphytic with old trees or dead trees.

Fertile: July to December.

Lepisorus (J.Sm.) Ching, Bull. Fan Mem. Inst. Biol. 4(3): 47, 56 (1933).

Lepisorus amaurolepidus (Sledge) B.K.Nayar & S.Kaur, Companion Handb. Ferns Brit. India 84 (1974).

Habit: Herb-Epiphyte.

Habitat: Occasionally found in epiphytic with dead logs.

Fertile: July to December.

Lepisorus nudus Ching, Bull. Fan Mem. Inst. Biol. 4: 83 (1933).

Habit: Herb-Epiphyte/Lithophyte

Habitat: Common, epiphytic with old trees in west coast semi-evergreen forest, rarely observed as lithophyte.

Fertile: June to December.

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Microsorium Link, Hort. Berol. [Link] 2: 110 (1833).

Microsorium punctatum Copel., Univ. Calif. Publ. Bot. 16: 111 (1929).

English Name: Bird nest fern.

Habit: Herb-Epiphyte/Lithophyte.

Habitat: Common as epiphytic with old trees in west coast semi-evergreen forest, and rarely observed as lithophyte in moss covered rock crevices.

Fertile: February to July.

Phlebodium (R.Br.) J.Sm., J. Bot. (Hooker) 4: 58 (1841).

Phlebodium aureum J.Sm., J. Bot. (Hooker) 4: 59 (1841).

English Name: Blue star fern.

Habit: Herb-Terrestrial.

Habitat: Occasional along the roadsides of the west coast semi-evergreen forest.

Fertile: January.

Pleopeltis Humb. & Bonpl. ex Willd., Sp. Pl., ed. 4 [Willdenow] 5: 211 (1810).

Pleopeltis macrocarpa (Bory ex Willd.) Kaulf., Berlin Jahrb. Pharm. 21: 41 (1820).

Habit: Herb-Epiphyte.

Habitat: Occasionally found in West coast semi-evergreen forest.

Fertile: October to December.

Pyrrosia Mirb., Hist. Nat. Vég. [Lam. & Mirbel] 3: 471; 5: 91 (1802).

Pyrrosia lanceolata (Wall.) Farw., Amer. Midl. Naturalist 12: 245 (1930).

Habit: Herb-Epiphytic/Lithophyte.

Habitat: In epiphytic with moss covered old tree trunks and moss-covered rocks and crevices.

Fertile: August-December.

Pyrrosia porosa (Presl) Hovenkamp, Blumea 30(1): 208 (1984).

Habit: Herb-Terrestrial.

Habitat: Occasional, grown on the dead logs in moist deciduous forest.

Fertile: August-December.

Psilotaceae J. W. Griff. & Henfr., Microgr. Dict. 540 (1855).

Psilotum Sw., J. Bot. (Schrader) 1800(2): 8, 109 (1801).

Psilotum nudum (L.) P.Beauv., Prodr. Aethéogam. 112 (1805).

English Name: Skeleton fork fern, Pine-leaved fern, Whisk fern.

Habit: Herb-Lithophyte.

Habitat: Occasional in the valley in the moist deciduous forest and crevices on wet rock.

Fertile: August-February.

Pteridaceae Ching, Webbia 35(2): 239 (1982).

Actiniopteris Link, Fil. spec. 73, 79. 1841.

Actiniopteris radiata (Sw.) Link, Fil. sp. 80. 1841.

English Name: Fan leaved fern.

Habit: Herb-Terrestrial.

Habitat: Common in low land, rock crevices, stream banks in dry and moist deciduous forests.

Fertile: September-February.

Adiantum L., Sp. Pl. 2: 1094 (1753).

Adiantum capillus-veneris L., Sp. Pl. 2: 1096 (1753).

Habit: Herb-Terrestrial

Habitat: Common in river banks and waysides of the moist deciduous forest.

Fertile: January.

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Adiantum caudatum L., Mant. Pl. Altera 308 (1771).

Habit: Herb-Terrestrial.

Habitat: Common along the road sides of the moist deciduous forest.

Fertile: October.

Adiantum raddianum C.Presl, Tent. Pterid. 158 (1836).

English Name: Delta maidenhair fern.

Habit: Herb-Terrestrial.

Habitat: Common in moist deciduous and West coast semi-evergreen forest.

Fertile: July to February.

Ceratopteris Brongn., Bull. Sci. Soc. Philom. Paris 1821. 186.

Ceratopteris thalictroides (L.) Brongn., Bull. Sci. Soc. Philom. Paris 1821. 186 c. tab. HB. 174. Chr. 357. NPfl. 342.

English Name: Water Sprite, Oriental water fern, vegetable fern.

Habit: Herb-Aquatic.

Habitat: Common in wetlands and rice fields.

Fertile: October to February.

Haplopteris C.Presl, Tent. Pterid. 141, t.5, f.21 (1836).

Haplopteris elongata (Sw.) E.H.Crane, Syst. Bot. 22: 514 (1997).

Habit: Herb-Epiphytic.

Habitat: Occasionally found in tall trees in West coast semi-evergreen forest.

Fertile: August to February.

Hemionitis L., Sp. Pl. 2: 1077 (1753).

Hemionitis arifolia (Burm.) T. Moore, Index Fil. (T.Moore) 6: 114 (1859).

English Name: Rabbit ear fern.

Habit: Herb-Terrestrial.

Habitat: Common in moist rocky crevices of the dry and moist deciduous forest.

Fertile: August to February.

Hemionitis tenuifolia (Burm.f.) Christenh., Global Fl. 4: 22 (2018).

Habit: Herb-Terrestrial.

Habitat: Common in forest margins and grasslands.

Fertile: July to January.

Pityrogramma Link, Handbuch [Link] 3: 19 (1833).

Pityrogramma calomelanos (L.) Link, Handb. Gewachse 3: 20 (1833).

English Name: Silver fern.

Habit: Herb-Terrestrial.

Habitat: Common in along roadsides of the West coast semi-evergreen forest.

Fertile: July to March.

Pteris L., Sp. Pl. 2: 1073 (1753).

Pteris cretica L., Mant. Pl. 130 (1767).

Habit: Herb-Terrestrial.

Habitat: Occasional in inside the forest streams.

Fertile: Throughout the year.

Pteris quadriaurita Retz., Observ. Bot. (Retzius) 6: 38 (1791).

Habit: Herb-Terrestrial.

Habitat: Occasional along the streams and river banks of the forest.

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Fertile: November to March.
Endemic to Western Ghats and Sri Lanka.

Pteris tripartita Sw., J. Bot. (Schrader) 1800(2): 67 (1801).
Habit: Herb-Terrestrial.
Habitat: Rarely found in wet locations.
Fertile: October to December.

Pteris vittata L., Sp. Pl. 2: 1074 (1753).
English Name: Chinese ladder brake, Chinese brake.
Habit: Herbs-Lithophyte.
Habitat: Occasionally grows on laterite walls and crevices
Fertile: November to February.

Schizaeaceae Kaulf., WesenFarrenk. [119] (1827).
Lygodium Sw., J. Bot. (Schrader) 1800(2): 7, 106 (1801), nom. cons.
Lygodium flexuosum (L.) Sw., J. Bot. (Schrader) 1800(2): 106 (1801).
English Name: Climbing fern, curly grass fern, Flexuose climbing fern.
Habit: Herb-Climbing, terrestrial.
Habitat: Occasional in open moist deciduous forest.
Fertile: August to February.

Selaginellaceae Willk., Anleit. Stud. Bot. 2: 163 (1854).
Selaginella P.Beauv., Mag. Encycl. 9(5): 478 (1804), nom. cons.
Selaginella tenera (Hook. & Grev.) Spring, Bull. Acad. Roy. Sci. Bruxelles 10: 232 (1843).
Habit: Herb-Terrestrial.
Habitat: Occasional in grasslands near to west coast semi-evergreen forest.
Fertile: September to November.
Endemic to Western Ghats.

Tectariaceae Panigrahi, J. Orissa Bot. Soc. 8(1): 41 (1986).
Tectaria Cav., Anales Hist. Nat. 1(2): 115 (1799).
Tectaria polymorpha (Wall. ex Hook.) Copel., Philipp. J. Sci., C 2: 413 (1907).
Habit: Herb-Terrestrial.
Habitat: Common in along the streams and river banks of the moist deciduous forest.
Fertile: December.

Thelypteridaceae Pic.Serm., Webbia 24: 709 (1970).
Thelypteris Schmidel, Icon. Pl., Ed. Keller 3, 45 (1763).
Thelypteris parasitica (L.) Tardieu, Notul. Syst. (Paris) 7: 75 (1938).
Habit: Herb-Terrestrial.
Habitat: Rarely found in West coast semi-evergreen forest.
Fertile: September to October.

Thelypteris tenera (Roxb.) C.V.Morton ex Fraser-Jenk., Taxon. Revis. Indian Subcontinental Pteridophytes 418 (2008).
Habit: Herb-Lithophyte.
Habitat: rarely found along the stream banks in moist deciduous forest.
Fertile: May.

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