

**Research article**

## A census of pteridophytes in Eastern Ghats, India

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**Abstract:** The present study focused on pteridophytes of the Eastern Ghats, India. A census of pteridophytes distributed in different states of the Eastern Ghats was prepared based on taxonomic literature, herbaria and field studies. Altogether, 184 species belonging to 75 genera under 40 families were enumerated. Of these, 20 species are common in states of the Eastern Ghats. The state-wise analysis shows that Odisha part of Eastern Ghats harbors a highest number of pteridophytes (142 spp.) followed by Andhra Pradesh (91 spp.), Tamil Nadu (67 spp.) and Karnataka (49 spp.). Odisha represents the highest number of unique species (65 spp.) followed by Karnataka (19) and Andhra Pradesh (13).

**Keywords:** Eastern Ghats - Odisha - Andhra Pradesh - Tamil Nadu - Karnataka - Ferns.

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### INTRODUCTION

Most of the information is available on woody plants of tropical forests (Gentry 1988, 1995), even though non-woody life forms typically contribute at least half of the vascular plant species richness in these habitats (Whitemore *et al.* 1985, Gentry & Dodson 1987, Duivenvoorden 1994, Galeano *et al.* 1998, Balslev *et al.* 1999, Dittrich *et al.* 2005). Pteridophytes, *i.e.* ferns and fern-allies, are one of the most abundant and diverse non-woody plant groups, including primarily terrestrial and epiphytic herbs, in addition to some tree ferns. They form an important group of vascular plants. Pteridophytes are grown in a variety of habitats and in all climatic zones of India. The nomenclature of ferns has undergone far more radical changes during the current century than those possibly of any other group of plants.

The disorder in nomenclatural confusion in Indian ferns is indeed very great and becomes a primary task for Indian botanists today. Nayar & Kaur (1974) have listed the nomenclatural changes with regards to Beddome (1883, 1892) names only. Later, Chandra & Kaur (1987, 1994) have also updated the nomenclature of all the taxa illustrated in Beddome's *Ferns of South India* (1863–1864) and *Ferns of British India* (1865–1870, 1876). Chandra (1981) presented a list of additions of 123 species to the Indian Flora (1960–1980). Dixit (1984) presented a comprehensive summary of the then known ferns from the present political boundary of India and has enumerated more than 1000 species of pteridophytes. Several novelties have since been discovered or described.

In India, pteridophytes are represented by about 1200 taxa under 204 genera (Bir 1987, Ghosh & Ghosh 1997). The nomenclatures of 219 taxa are updated by Chandra (2000). India represents about 17% of endemic species. The families Polypodiaceae (137 spp.), Dryopteridaceae (125 spp.), Athyriaceae (97 spp.), Thelypteridaceae (83 spp.), Selaginellaceae (62 spp.) and genera *Selaginella* (62 spp.), *Pteris* (62 spp.), *Dryopteris* (53 spp.), *Asplenium* (45 spp.) and *Polystichum* (45 spp.) dominate the pteridophytic flora. *Pteris* (28 spp.) and *Asplenium* (26 spp.) dominate the peninsular India. The Eastern Himalaya and northeast India with about 845 taxa in 179 genera is the richest region representing 67% of pteridophytes known from the country, followed by south India with 345 taxa in 117 genera and north India including Western Himalaya with 340 taxa in 101 genera. However, most of these studies have focused on the Himalayas, the Western Ghats and North

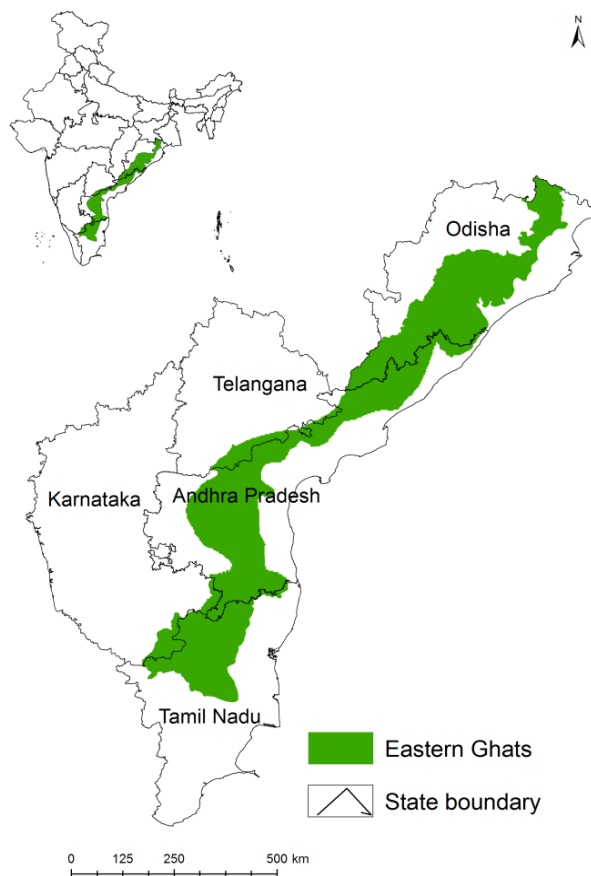
East India, little is known about the distribution of pteridophyte diversity in the Eastern Ghats region.

State-wise and region-wise studies of ferns and fern allies have been made in other parts of India- *i.e.* Darjeeling and Sikkim Himalayas (Mehra & Bir 1964), North-Western Himalayas (Dhir 1980), Garhwal Himalaya (Bir *et al.* 1982), Meghalaya (Baishya & Rao 1982), Palni hills (Manickam 1986), Western Ghats – South of Palghat gap (Manickam & Irudayaraj 1992), North Eastern India (Bir *et al.* 1992), Malabar (Nayar & Geevarghese 1993), Orissa (Saxena & Brahmam 1996), Polypodoid ferns of south India (Nampy & Madhusoodanan 1998), Karnataka (Rajagopal & Bhat 1998), Andhra Pradesh (Pullaiah *et al.* 2003) and Arunachal Pradesh (Singh & Panigrahi 2005). The present paper highlights a comprehensive database on the pteridophytes of the Eastern Ghats for the first time covering Odisha, Andhra Pradesh, Tamil Nadu and Karnataka.

## MATERIAL AND METHODS

### Study area

The Eastern Ghats are spread over in parts of five states, *viz.* Odisha (Orissa), Andhra Pradesh, Telangana, Tamil Nadu and Karnataka in Peninsular India (Fig. 1). It is situated between 11° 30' to 21° 0' N latitude and 77° 22' to 85° 20' E longitude. The wide range of topography and varied climate of the Eastern Ghats, provided by the hills rising from almost sea level to about 1672 m altitude, shaped the land to harbor rich and diverse flora. They are not formed of one particular geological formation but consist of rocks varying in origin and structure according to the location (Meher-Homji 2001). The forests in the Eastern Ghats are broadly classified into Evergreen, Semi-evergreen, Moist deciduous and Dry deciduous types (Champion & Seth 1968).



**Figure 1.** Location map of the study area.

The geographical area of the Eastern Ghats is about 2,05,088.60 km<sup>2</sup>, whereas natural vegetation covers an area of 98,780 km<sup>2</sup> (48.16 %) (Reddy *et al.* 2015). The Eastern Ghats of Odisha occupy 49532.60 km<sup>2</sup> and distributed in Phulbani, Kalahandi, Gajapati, Rayagada, Ganjam, Koraput and Malkangiri districts similarly the Eastern Ghats of Andhra Pradesh occupies 98,662 km<sup>2</sup> and represented in parts of Visakhapatnam, East Godavari, West Godavari, Guntur, Krishna, Kurnool, Prakasham, Nellore, Cuddapah, Anantapur and Chittoor districts whereas the Eastern Ghats of Tamil Nadu covers 42,653 km<sup>2</sup> and spread over in parts of Vellore, Erode, Salem, Namakkal, Dharmapuri, Tiruvanmalai, Tiruchirapalli, Pudukkottai and Villupuram districts and the Eastern Ghats of Karnataka part spread over 14,241 km<sup>2</sup> and found in Chamrajnagar, Kolar and Bellary districts

(Reddy *et al.* 2006, Reddy *et al.* 2013).

#### Methodology

Three sources of data were utilized for compiling the information on pteridophytes: intensive literature survey, a study of pteridophytic species in herbaria of different Universities and Botanical Survey of India and field observations. The main sources of taxonomic literature for the Eastern Ghats are from Census of Indian Pteridophytes (Dixit 1984), Flora of Orissa (Saxena & Brahmam 1996), Pteridophytic flora of Karnataka (Rajagopal & Bhat 1998) and Pteridophytes in Andhra Pradesh (Pullaiah *et al.* 2003). Classification of Pichi-Sermolli (1977) has been followed in the enumeration of families.

## RESULTS AND DISCUSSION

During the present study as many as 184 species of ferns and fern allies, representing 75 genera under 40 families were documented (Table 1). The genus and species ratio was 1:8 with family and genus ratio was 2.4. These include Tree ferns (*Alsophila* and *Cyathea* species), Royal ferns (*Osmunda* species), Maiden-hair ferns (*Adiantum* species), Brake ferns (*Pteris* species), Silver ferns (*Cheilanthes* species), Dryopteroid ferns (*Dryopteris* species), Walking ferns (*Ampelopteris* species), Spleenworts (*Asplenium* species), Edible ferns (*Diplazium* species), Sword ferns (*Nephrolepis* species), Hardy ferns (*Blechnum orientale* L.), Polypods (*Microsorium*, *Pleopeltis*), Whisk ferns (*Psilotum nudum* (L.) P. Beauv.), Horse tails or scouring rushes (*Selaginella* species), Quill-worts (*Isoetes* species) and Water ferns (*Marsilea*, *Salvinia cucullata* Roxb. ex Bory and *Azolla* species).

**Table 1.** Enumeration of Pteridophytes of the Eastern Ghats.

Family/Species	Habitat	Odisha	Andhra Pradesh	Tamil Nadu	Karnataka
<b>Actiniopteridaceae</b>					
<i>Actiniopteris radiata</i> (Sw.) Link [= <i>A. dichotoma</i> Kuhn]	Terrestrial	+	+	+	+
<b>Adiantaceae</b>					
<i>Adiantum capillus-veneris</i> L.	Terrestrial	+	+	+	+
<i>Adiantum caudatum</i> L.	Terrestrial	-	+	+	-
<i>Adiantum incisum</i> Forssk. [= <i>A. caudatum</i> auct. non L.]	Terrestrial	+	+	+	+
<i>Adiantum lunulatum</i> Burm.f. [= <i>A. philippense</i> auct. non. L.]	Terrestrial	+	+	+	+
<i>Adiantum raddianum</i> Presl.	Terrestrial	-	-	-	+
<b>Angiopteridaceae</b>					
<i>Angiopteris evecta</i> (Forst.) Hoff.	Terrestrial	+	+	+	-
<b>Antrophyaceae</b>					
<i>Antrophyum reticulatum</i> Beddome [= <i>A. plantagineum</i> (Cav.) Kaulf.]	Epiphyte	+	+	+	-
<b>Aspleniaceae</b>					
<i>Asplenium aethiopicum</i> (Burm.f.) Bech.	Terrestrial	+	+	-	-
<i>Asplenium decrescens</i> Kuntze	Epiphyte	-	-	-	+
<i>Asplenium formosum</i> Willd.	Epiphyte	+	+	+	-
<i>Asplenium indicum</i> Sledge	Epiphyte	+	+	+	-
<i>Asplenium inequilaterale</i> Willd.	Epiphyte	+	+	-	-
<i>Asplenium laciniatum</i> D.Don	Epiphyte	+	+	+	-
<i>Asplenium lunulatum</i> Sw.	Epiphyte	+	-	-	-
<i>Asplenium obscurum</i> Blume	Epiphyte	-	+	+	-
<i>Asplenium perakense</i> Mathew & Christ	Epiphyte	+	-	-	-
<i>Asplenium polyodon</i> G. Forster [= <i>A. falcatum</i> Lam.]	Epiphyte	-	+	-	-
<i>Asplenium rockii</i> C. Chr.	Epiphyte	-	-	-	+
<i>Asplenium unilaterale</i> Lam. var. <i>majus</i> (C.Chr.) Sledge	Epiphyte	+	-	-	-
<i>Asplenium unilaterale</i> Lam. var. <i>unilaterale</i>	Epiphyte	+	-	-	-
<i>Asplenium varians</i> Wall. ex Hook. & Grev.	Epiphyte	+	-	-	-
<b>Athyriaceae</b>					
<i>Anisocampium cumingianum</i> Presl	Terrestrial	+	-	-	-
<i>Athyrium drepanopterum</i> (Kunze) R. Br.	Terrestrial	+	-	-	-

<i>Athyrium falcatum</i> Bedd.	Terrestrial	+	-	-	-
<i>Athyrium hohenackerianum</i> (Kunze) Moore	Aquatic	+	+	+	-
<i>Athyrium nigripes</i> (Bl.) T. Moore	Terrestrial	-	+	-	-
<i>Athyrium parasnathense</i> (Clarke) Ching ex Bir	Terrestrial	+	-	-	-
<i>Cyrtomium aequibasis</i> (C.Chr.) Ching	Terrestrial	+	-	-	-
<i>Diplazium dilatatum</i> Bl.	Terrestrial	+	-	-	-
<i>Diplazium esculentum</i> (Retz.) Sw.	Terrestrial	+	+	+	-
<i>Diplazium japonicum</i> (Thunb.) Beddome	Terrestrial	-	+	+	-
<i>Diplazium lasiopteris</i> Kunze	Terrestrial	+	-	-	-
<i>Diplazium polypodioides</i> Bl.	Terrestrial	+	+	+	-
<i>Tectaria cicutaria</i> (L.) Copel	Terrestrial	+	-	-	-
<i>Tectaria polymorpha</i> (Wall. ex Hook.) [= <i>T. wightii</i> (Clarke) Ching]	Terrestrial	+	+	+	-
<b>Azollaceae</b>					
<i>Azolla imbricata</i> (Roxb. ex Griff.) Nakai	Aquatic	+	-	-	-
<i>Azolla pinnata</i> R.Br.	Aquatic	+	+	+	-
<b>Blechnaceae</b>					
<i>Blechnum orientale</i> L.	Terrestrial	+	+	+	-
<i>Woodwardia unigemmata</i> (Makino) Nakai	Terrestrial	+	-	-	-
<b>Botrychiaceae</b>					
<i>Botrychium daucifolium</i> Wall. ex Hook. & Grev.	Terrestrial	+	+	+	-
<i>Botrychium lanuginosum</i> Wall. ex Hook. & Grev.	Terrestrial	-	-	-	+
<b>Cheilanthaceae</b>					
<i>Cheilanthes albomarginata</i> Clarke	Terrestrial	+	-	-	+
<i>Cheilanthes anceps</i> Blanf.	Terrestrial	+	+	+	-
<i>Cheilanthes dalhousiae</i> Hook.	Terrestrial	+	-	-	-
<i>Cheilanthes farinosa</i> (Forssk.) Kaulf.	Terrestrial	+	+	+	-
<i>Cheilanthes grisea</i> Blanf.	Terrestrial	+	-	-	-
<i>Cheilanthes mysorensis</i> Wall. ex Hook.	Terrestrial	+	+	+	-
<i>Cheilanthes swartzii</i> Webb. & Benth.	Terrestrial	-	-	-	+
<i>Cheilanthes tenuifolia</i> (Burm.f.) Sw.	Terrestrial	+	+	+	-
<b>Cyatheaceae</b>					
<i>Alsophila andersonii</i> J.Scott ex Bedd.	Terrestrial	+	-	-	-
<i>Alsophila balakrishnananii</i> (Dixit & Tripathi) Dixit [= <i>Cyathea balakrishnanii</i> Dixit & Tripathi]	Terrestrial	+	-	-	-
<i>Alsophila gigantea</i> Wall. ex Hook. [= <i>Cyathea gigantea</i> (Wall. ex Hook.) Holttum]	Terrestrial	+	+	-	-
<i>Alsophila spinulosa</i> Wall. ex Hook. [= <i>Cyathea spinulosa</i> Wall. ex Hook.]	Terrestrial	+	+	-	-
<i>Cyathea nilgirensis</i> Holttum	Terrestrial	-	+	+	-
<b>Davalliaceae</b>					
<i>Araiostegia pulchra</i> (D.Don) Copel.	Epiphyte	+	-	-	+
<i>Leucostegia immersa</i> (Wall. ex Hook.) Presl	Terrestrial	+	-	-	-
<b>Dennstaedtiaceae</b>					
<i>Hypolepis glandulifera</i> Browney & Chinnock	Terrestrial	-	-	-	+
<i>Microlepia marginata</i> (Houtt.) C. Chr.	Terrestrial	+	-	-	-
<i>Microlepia platyphylla</i> (D.Don) J. Sm.	Terrestrial	+	+	+	-
<i>Microlepia speluncae</i> (L.) Moore	Terrestrial	+	+	+	-
<b>Dicranopteridaceae</b>					
<i>Dicranopteris linearis</i> (Burm.f.) Underwood	Terrestrial	+	+	+	+
<b>Drynariaceae</b>					
<i>Drynaria quercifolia</i> (L.) J. Smith	Epiphyte	+	+	+	+
<b>Dryopteridaceae</b>					
<i>Arachniodes aristata</i> (Forst.f.) Tindale	Terrestrial	+	+	-	-
<i>Dryopteris cochleata</i> (D.Don.) C.Chr.	Terrestrial	+	+	+	+
<i>Dryopteris hirtipes</i> (Blume) Kuntze	Terrestrial	-	-	-	+
<i>Dryopteris sparsa</i> (Buch.-Ham. ex D.Don) Kuntze	Terrestrial	-	+	+	+
<i>Dryopteris sparsa</i> (D.Don) Kuntze	Terrestrial	+	-	-	-
<i>Polystichum squarrosus</i> (D.Don) Fee	Terrestrial	-	-	-	+
<i>Tectaria coadunata</i> (J.Smith) C.Chr.	Terrestrial	-	+	+	+

<b>Equisetaceae</b>					
<i>Equisetum diffusum</i> D.Don.	Terrestrial	+	-	-	-
<i>Equisetum ramossissimum</i> Desf. subsp. <i>debile</i> (Roxb. ex Vouch.) Hanke	Terrestrial	+	+	+	-
<b>Helminthostachyaceae</b>					
<i>Helminthostachys zeylanica</i> (L.) Hook.	Terrestrial	+	-	-	-
<b>Hemionitidaceae</b>					
<i>Coniogramme fraxinea</i> (D.Don) Fee ex Diels	Terrestrial	+	-	-	-
<i>Hemionitis arifolia</i> (Burm.f.) Moore	Terrestrial	+	+	+	+
<i>Pityrogramma calomelanos</i> (L.) Link	Terrestrial	-	+	-	-
<b>Huperziaceae</b>					
<i>Huperzia hamiltonii</i> (Spreng) Trev.	Epiphyte	+	-	-	-
<i>Huperzia squarrosa</i> (Forst.) Trev.	Terrestrial	+	-	-	-
<b>Hymenophyllaceae</b>					
<i>Mecodium exsertum</i> (Wall. ex Hook.) Copel.	Terrestrial	+	-	-	-
<b>Hymenophyllaceae</b>					
<i>Trichomanes plicatum</i> (Bosch.) Beddome	Terrestrial	-	+	-	+
<b>Isoetaceae</b>					
<i>Isoetes coromandelina</i> L.f.	Terrestrial	+	+	+	+
<i>Isoetes dixitei</i> Shende	Terrestrial	-	-	-	+
<i>Isoetes panchananii</i> Pant & Srivastava	Terrestrial	-	+	-	-
<i>Isoetes sampathkumaranii</i> Rao	Terrestrial	-	+	-	-
<b>Lindsaeaceae</b>					
<i>Lindsaea ensifolia</i> Sw.	Terrestrial	+	+	+	-
<i>Sphenomeris chinensis</i> (L.) Maxon	Terrestrial	+	+	-	-
<b>Lomariopsidaceae</b>					
<i>Bolbitis appendiculata</i> (Willd.) K. Iwats [= <i>Egenolfia appendiculata</i> (Willd.) J. Smith]	Terrestrial	+	+	+	-
<i>Bolbitis contaminans</i> (Wall.) Ching	Terrestrial	+	-	-	-
<i>Bolbitis costata</i> (Wall. ex Hook.) Ching	Terrestrial	+	-	-	-
<i>Bolbitis kanarensis</i> Nayar & Chandra	Terrestrial	+	-	-	-
<i>Bolbitis virens</i> (Wall. ex Hook. & Grev.) Schott	Terrestrial	+	-	-	-
<i>Egenolfia appendiculata</i> (Willd.) J. Sm.	Terrestrial	+	-	-	-
<i>Egenolfia bipinnatifida</i> J. Sm.	Terrestrial	+	-	-	-
<b>Lycopodiaceae</b>					
<i>Lycopodiella cernua</i> (L.) Pic. [= <i>Palhinhaea cernua</i> (L.) Franco et Vasc.]	Terrestrial	+	+	-	-
<i>Lycopodium hamiltonii</i> Spring.	Epiphyte	-	-	-	+
<i>Lycopodium nilagiricum</i> Spring.	Epiphyte	-	-	-	+
<i>Lycopodium phyllanthum</i> Hook. & Arn.	Epiphyte	-	-	-	+
<b>Lygodiaceae</b>					
<i>Lygodium altum</i> (Clarke) v.A.v.R.	Terrestrial	+	-	-	-
<i>Lygodium flexuosum</i> (L.) Sw.	Terrestrial	+	+	-	-
<i>Lygodium microphyllum</i> R.Br.	Terrestrial	+	+	-	-
<b>Marsileaceae</b>					
<i>Marsilea minuta</i> L.	Aquatic	+	+	+	+
<i>Marsilea quadrifolia</i> L.	Aquatic	+	+	+	-
<b>Nephrolepidaceae</b>					
<i>Nephrolepis biserrata</i> (Sw.) Schott.	Terrestrial	+	-	+	-
<i>Nephrolepis cordifolia</i> (L.) Presl.	Terrestrial	+	+	+	-
<i>Nephrolepis delicatula</i> (Decne) Pichi-Sermolli	Terrestrial	+	-	-	-
<i>Nephrolepis exaltata</i> (L.) Schott	Terrestrial	+	-	-	-
<i>Nephrolepis hirsutula</i> (Forst.) Presl	Terrestrial	+	-	-	-
<i>Nephrolepis multiflora</i> (Roxb.) Jarret	Terrestrial	-	+	-	-
<i>Nephrolepis auriculata</i> (L.) Trimen.	Terrestrial	-	-	-	+
<b>Ophioglossaceae</b>					
<i>Ophioglossum costatum</i> R.Br. [= <i>O. gramineum</i> Willd.]	Terrestrial	+	+	+	-
<i>Ophioglossum nudicaule</i> L.f.	Terrestrial	+	+	+	-
<i>Ophioglossum polyphyllum</i> A.Br.	Terrestrial	+	-	-	-

<i>Ophioglossum reticulatum</i> L.	Terrestrial	+	+	+	-
<b>Osmundaceae</b>					
<i>Osmunda regalis</i> L.	Terrestrial	-	+	-	-
<b>Parkeriaceae</b>					
<i>Ceratopteris thalictroides</i> (L.) Brongn.	Aquatic	+	+	+	+
<b>Polypodiaceae</b>					
<i>Colysis hemionitidea</i> (Wall. ex Mett.) Presl	Terrestrial	+	-	-	-
<i>Colysis pedunculata</i> (Hook. & Grev.) Ching	Terrestrial	+	-	-	-
<i>Drymoglossum piloselloides</i> Presl.	Epiphyte	+	-	+	-
<i>Lepisorus excavatus</i> (Willd.) Ching	Terrestrial	+	-	-	-
<i>Lepisorus nudus</i> (Hook.) Ching	Terrestrial	+	-	+	+
<i>Lepisorus thunbergianus</i> (Kaulf.) Ching	Terrestrial	+	-	-	-
<i>Leptochilus decurrens</i> Blume	Terrestrial	-	-	-	+
<i>Loxogramme involuta</i> (D.Don) Presl.	Epiphyte	-	-	-	+
<i>Microsorium membranaceum</i> (D.Don) Ching	Epiphyte	-	-	-	+
<i>Microsorium punctatum</i> (L.) Copel.	Terrestrial	+	-	-	-
<i>Paraleptochilus decurrens</i> (Bl.) Copel. [= <i>Leptochilus decurrens</i> Bl.]	Terrestrial	+	+	+	-
<i>Phymatosorus nigrescens</i> (Bl.) Pichi-Sermolli	Terrestrial	+	-	-	-
<i>Pleopeltis macrocarpa</i> (Bory ex Willd.) Kaulf.	Terrestrial	-	-	-	+
<i>Pyrrosia adnascens</i> (Sw.) Ching	Epiphyte	+	+	+	-
<i>Pyrrosia gardneri</i> (Mett.) Sledge	Epiphyte	+	-	-	-
<i>Pyrrosia lanceolata</i> (L.) Farwell	Epiphyte	+	+	-	-
<i>Pyrrosia mannii</i> (Gies.) Ching	Epiphyte	+	-	-	-
<i>Pyrrosia mollis</i> (Kunze) Ching	Epiphyte	+	+	-	-
<i>Pyrrosia nayariana</i> Ching & Chandra	Epiphyte	+	-	-	-
<i>Pyrrosia porosa</i> (Presl.) Hovenkamp	Epiphyte	-	-	-	+
<i>Pyrrosia stigmosa</i> (Sw.) Ching	Epiphyte	+	-	-	-
<b>Psilotaceae</b>					
<i>Psilotum nudum</i> (L.) P. Beauv.	Epiphyte	+	+	+	+
<b>Pteridaceae</b>					
<i>Pteridium aquilinum</i> (L.) Kuhn	Terrestrial	+	+	+	+
<i>Pteris argyraea</i> T. Moore	Terrestrial	-	-	-	+
<i>Pteris biaurita</i> L.	Terrestrial	+	+	+	-
<i>Pteris confusa</i> T.G. Walker	Terrestrial	-	+	-	-
<i>Pteris cretica</i> L.	Terrestrial	+	-	-	-
<i>Pteris heteromorpha</i> Fee	Terrestrial	+	-	-	-
<i>Pteris nemoralis</i> Willd.	Terrestrial	+	-	-	-
<i>Pteris pellucida</i> Presl.	Terrestrial	+	+	+	+
<i>Pteris quadriaurita</i> Retz.	Terrestrial	+	+	+	+
<i>Pteris vittata</i> L.	Terrestrial	+	+	+	+
<b>Salviniaceae</b>					
<i>Salvinia cucullata</i> Roxb. ex Bory [= <i>S. molesta</i> Mitch]	Aquatic	+	+	-	-
<b>Selaginellaceae</b>					
<i>Selaginella bryopteris</i> (L.) Baker	Terrestrial	+	+	+	-
<i>Selaginella ciliaris</i> (Retz.) Spring.	Terrestrial	+	+	+	+
<i>Selaginella indica</i> (Milde) Trayon.	Terrestrial	+	+	+	-
<i>Selaginella involvense</i> (Sw.) Spring.	Terrestrial	-	+	-	-
<i>Selaginella monospora</i> Spring.	Terrestrial	+	-	-	-
<i>Selaginella nairii</i> Dixit	Terrestrial	+	-	-	-
<i>Selaginella pallidissima</i> Spring.	Terrestrial	+	-	-	-
<i>Selaginella plana</i> (Desv. ex Poiret) Hiern.	Terrestrial	-	-	-	+
<i>Selaginella radicata</i> (Hook. & Grev.) Spring.	Terrestrial	-	+	-	-
<i>Selaginella repanda</i> (Desv. ex Poiret) Spring.	Terrestrial	+	+	+	+
<i>Selaginella subdiaphana</i> (Wall. ex Hook. & Grev.) Spring.	Terrestrial	+	-	-	-
<i>Selaginella tenera</i> (Hook. & Grev.) Spring.	Terrestrial	-	-	+	+
<i>Selaginella vaginata</i> Spring	Terrestrial	+	-	-	-
<i>Selaginella wightii</i> Hiern.	Terrestrial	-	+	+	+

<b>Sinopteridaceae</b>					
<i>Doryopteris concolor</i> (Langsd. & Fisch.) Kuhn	Terrestrial	+	+	-	-
<i>Doryopteris ludens</i> (Wall. ex Hook.) J. Sm.	Terrestrial	+	-	-	-
<b>Stenochlaenaceae</b>					
<i>Stenochlaena palustris</i> (Burm.f.) Bedd.	Epiphyte	+	+	+	-
<b>Thelypteridaceae</b>					
<i>Ampelopteris prolifera</i> (Retz.) Copel.	Terrestrial	+	+	-	-
<i>Amphineuron opulentum</i> (Kaulf.) Holttum	Terrestrial	+	-	-	-
<i>Amphineuron terminans</i> (Hook.) Holttum	Terrestrial	+	-	-	+
<i>Christella dentata</i> (Forssk.) Browney & Jermy	Terrestrial	+	+	+	+
<i>Christella hispidula</i> (Decne.) Holtt.	Terrestrial	-	+	+	-
<i>Christella parasitica</i> (L.) Leveille	Terrestrial	+	+	+	+
<i>Christella semisagittata</i> (Roxb. ex Griff.) Holtt.	Terrestrial	+	-	-	-
<i>Christella subpubescens</i> (Bl.) Holtt.	Terrestrial	+	-	-	-
<i>Cyclosorus gongylodes</i> (Sehkuhr) Link	Terrestrial	+	+	+	-
<i>Macrothelypteris ornata</i> (Wall. ex Bedd.) Ching	Terrestrial	+	-	-	-
<i>Macrothelypteris torresiana</i> (Gaud.) Ching	Terrestrial	+	+	+	-
<i>Pneumatopteris turncata</i> (Poir.) Holtt.	Terrestrial	+	-	-	-
<i>Pronephrium nudatum</i> (Roxb. ex Griff.) Holtt.	Terrestrial	+	+	+	-
<i>Pseudocyclosorus falcilobus</i> (Hook.) Ching	Terrestrial	+	-	-	-
<i>Pseudocyclosorus tyloides</i> (Kunze) Ching	Terrestrial	-	+	-	-
<i>Sphaerostephanos unitus</i> (L.) Holtt.	Terrestrial	+	-	-	-
<i>Trigonospora calcarata</i> (Bl.) Holtt.	Terrestrial	+	-	-	-
<i>Trigonospora ciliata</i> (Benth.) Holtt.	Terrestrial	+	+	+	-
<b>Vittariaceae</b>					
<i>Vittaria elongata</i> Sw.	Epiphyte	-	+	-	-
	<b>Total</b>	<b>142</b>	<b>91</b>	<b>67</b>	<b>49</b>

The predominant families are Polypodiaceae (21 species), Thelypteridaceae (18), Aspleniaceae (14), Athyriaceae (14), Selaginellaceae (14), Pteridaceae (10), Cheilantheaceae (8), Dryopteridaceae (7), Lomariopsidaceae (7) and Nephrolepidaceae (7). These top ten families represent 120 species covering 65% of the total taxa. Whereas, 13 families represent one species each, *i.e.* Actiniopteridaceae, Angiopteridaceae, Antrophyaceae, Dicranopteridaceae, Drynariaceae, Helminthostachyaceae, Oleandraceae, Osmundaceae, Parkeriaceae, Psilotaceae, Salviniaceae, Stenochlaenaceae and Vittariaceae. Of the 75 genera, *Asplenium* and *Selaginella* are the dominant with 14 species each, followed by *Pteris* (9), *Cheilanthes* (8) *Pyrrosia* (8), *Adiantum* (5), *Athyrium* (5), *Bolbitis* (5), *Christella* (5) and *Diplazium* (5).

Pteridophytes of the Eastern Ghats exhibit a broad spectrum of ecological types from hydrophytes (*Athyrium hohenackerianum* (Kunze) Moore, *Ceratopteris thalictroides* (L.) Brongn., *Azolla* species, *Salvinia cucullata* and *Marsilea* species) to xerophytes (*Actiniopteris radiata* (Sw.) Link, *Selaginella indica* (Milde) Trayon. and *Selaginella wightii* Hiern.) and terrestrial to epiphytic ferns. Of the 184 species, 176 were herbs followed by four tree ferns (*Alsophila* and *Cyathea* species) and four climbers.

Though the terrestrial pteridophytes prefer shady and moist places but a few like *Actiniopteris radiata* (Sw.) Link, *Cheilanthes* species, *Leptochilus decurrens* Blume, *Selaginella indica* (Milde) Trayon., *Selaginella wightii* Hiern., *Trichomanes plicatum* (Bosch.) Beddome, *Trigonospora calcarata* (Bl.) Holtt. and *Trigonospora ciliata* (Benth.) Holtt. are lithophytic. *Adiantum lunulatum* Burm.f., *Psilotum nudum* (L.) P. Beauv. grown on rocks covered with mosses. There are 142 (77.6%) species of terrestrial ferns followed by 34 epiphytic and seven aquatic ferns (hydrophytes). *Adiantum capillus-veneris* L., *Selaginella bryopteris*, *Lycopodium* species, *Actiniopteris* species, *Marsilea* species are well known for their medicinal properties (Baskaran *et al.* 2018).

Of the 184 species, only 20 (11%) species are generalists and share their distribution throughout the Eastern Ghats. These are *Actiniopteris radiata* (Sw.) Link, *Adiantum capillus-veneris* L., *Adiantum incisum* Forssk., *Adiantum lunulatum* Burm.f., *Ceratopteris thalictroides* (L.) Brongn., *Christella dentata* (Forssk.) Browney & Jermy, *Christella parasitica* (L.) Leveille, *Dicranopteris linearis* (Burm.f.) Underwood, *Drynaria quercifolia* (L.) J. Smith, *Dryopteris cochleata* (D. Don.) C. Chr., *Hemionitis arifolia* (Burm.f.) Moore, *Isoetes coromandelina* L.f., *Marsilea minuta* L., *Psilotum nudum* (L.) P. Beauv., *Pteridium aquilinum* (L.) Kuhn, *Pteris pellucida* Presl., *Pteris quadriaurita* Retz., *Pteris vittata* L., *Selaginella ciliaris* (Retz.) Spring. and *Selaginella repanda* (Desv. ex Poiret) Spring.

The state-wise analysis shows that Odisha part of the Eastern Ghats harbors a high number of pteridophytes (142 spp.) followed by Andhra Pradesh (91 spp.), Tamil Nadu (67 spp.) and Karnataka (49 spp.). But in parts of [www.tropicalplantresearch.com](http://www.tropicalplantresearch.com)

Eastern Ghats of Karnataka area is very less number of pteridophytes as compared with other states. Still, the presence of 49 species in the Eastern Ghats of Karnataka part (within 14,241 km<sup>2</sup>) is mainly by the presence of evergreen forests in this area and is considered as a transitional region of the Eastern Ghats and the Western Ghats. The presence of 141 species of pteridophytes in Odisha is mainly due to the representation of south Indian and north Indian forest types. Odisha represents a high number of unique species (65 spp.) followed by Karnataka (19 spp.) and Andhra Pradesh (13 spp.). Whereas, 69 species are common to Odisha and Andhra Pradesh state followed by 63 species are common for Andhra Pradesh and Tamil Nadu state.

## CONCLUSION

From the study, it is evident that the Eastern Ghats are also rich in the diversity of pteridophytes. The problem of shifting cultivation, forest fires, grazing, biological invasion and other anthropogenic pressures posing much threat to the survival of ferns and fern allies. There is a need for coordinated research efforts to survey and identification of critical areas for the protection of for pteridophytes in the Eastern Ghats. The development of fern gardens in botanic gardens, documentation and digitization of ferns and associated indigenous/traditional knowledge is essential.

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