



## Pteridophytes dominant genera *Adiantum*, *Pteris* and *Phymatopteris* and their key identification

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### Abstract

Pteridophytes are the first terrestrial vascular plants with vascular tissue xylem and phloem. They do not produce flowers or seeds, thus called as cryptogams. They reproduce by spores. They include ferns and horsetails. Ferns and their allies form the oldest major divisions of the Pteridophytes with more than 12000. Ferns can grow in all climatic zones but show great diversity in the tropics. They are found in damp and shady places. Ferns are used as food, fodder, fiber and as ornamentals. There are a lot of studies on the economic values of higher plants but pteridophytes have been ignored. Major three genera *VIZ*, *pteris*, *adiantum* and *phymatopteris* were identified that showing maximum species numbers 10 species, 06 species and 05 species respectively. Morphological Keys identification is also performed for authentic information.

**Keywords:** pteridophytes dominant genera *Adiantum*, *Pteris*, *Phymatopteris*

### Introduction

Kumaun Himalaya occupies the central sector of Indian Himalaya and lies between 28°44'- 30° 49'N Lat. and 78° 45'- 81° and 1' E long. It has occupy an area 21,033 sq km and made up of six districts. Due to varied topography, climate, soil and vegetation this region is very rich in Pteridophytes. Kali valley, Gori valley, Ram ganga valley, Pindari valley are the important area where these Pteridophytes are very abundant. Pteridophytes are one of the oldest land plant groups on earth and constitute a vast group of vascular cryptogams. The position of the Pteridophytes as intermediate between the lower cryptogams and higher vascular plants has made the group fascinating. Pteridophytes have a long geological history on our planet. They were known as far back as 380 million years ago. In India, Pteridophytes are particularly distributed in the Himalayan and coastal regions. Khullar (1991, 1994) [12, 13, 14] recorded 356 species of Pteridophytes from Western Himalaya. Pteridophytes prefer shady, moist habitats with moderate temperature but also occur through out a very diverse range of habitats from high altitude. Like other groups of plants, Pteridophytes are also show medicinal utility and many of them are being used medicinally from ancient time (Kumar and Kaushik 1999) [5]. The tribal communities, ethnic group and folklore throughout the world are utilizing plant parts like rhizome, stem, fronds, pinnae and spores in various ways for the treatment of various ailments since ancient time.

Pteridophytes are an ancient evolutionary and interesting group of plants and form an important component of Himalayan flora, where the ground flora are well supplemented by epiphytic ferns. Though pteridophytes form an important part of Himalayan vegetation, yet it has remained neglected group as compared to flowering plants of Indian Himalaya. A scrutiny and survey of published literature on pteridophytic flora of Kumaun Himalaya indicates that much work has been done so far. Among the earlier workers, who made significant contributions to the pteridophytic flora of Kumaun Himalaya include Clarke (1880) [3], Bed dome (1883 & 1892) [1, 2], Hope (1899-1904)

[8], Duthie (1906) [6], Loyal and Verma (1960), Verma and Khullar (1980) [12, 13, 14], Dhir (1980) [4], Pangtey *et al.* (1982 & 1991) [17], Pangtey and Punetha (1987) [17, 18], Punetha and Kaur (1987) [11, 18], Pande (1990) [10, 15, 16], Khullar *et al.* (1991) [12, 13, 14], Khullar (1994 & 2000) [12, 13, 14], Dixit and Kumar (2002) [5], Pande and Pande (2002 & 2003) [10, 15, 16], Fraser-Jenkins (2009) [7], Joshi *et al.* (2009) [10] and several others.

The numbers of contribution about the taxonomy, ecology and distribution of Pteridophytes have been published from time to time but enough attention have not been paid towards their medicinal useful aspects (Dixit, 1975) [5]. In the present attempt have been made to explore ethno medicinally important Pteridophytes and properly documented their useful aspect

### Material method

Extensive field visits were conducted for the authentic information. The present work is based on the detailed and careful collections of pteridophytic flora of the study area between the altitudes, stretching from 800-2,356 m, throughout the year particularly during rainy season, when almost all pteridophytes show abundant and luxuriant growth and development.

During the field explorations, observations on the habit, habitat, size of fronds, nature of rhizomes, scales, branching of fronds, abundance and ecology *etc.* of pteridophytic flora were recorded. The method of collections, pressing, poisoning and mounting was carried following Jain and Rao (1976) [9, 19].

All the specimens collected were critically examined and identified mainly with the help of Clarke (1880) [3], Bed dome (1883 & 1892); Hope (1899-1904); Khullar *et al.* (1991) [12, 13, 14]; Khullar (1994 & 2000) [12, 13, 14]; Pande and Pande (2003); Fraser-jenkins (2009) [7]; Joshi *et al.* (2009) [10] and several other important published works.

### Results

Observation showed that three genera *VIZ*, *pteris*, *adiantum* and *phymatopteris* showing maximum species numbers 10

species, 06 species and 05 species respectively. Key identification of species was also done and key were presentd in results.

**Phymatopteris Pichi Sermolli**  
**Webbia 28: 460 (1973).**

Rhizome long-creeping, dictyostelic, thick, fleshy, scaly; scales brown, generally bicolorous, linear-lanceolate or broad lanceolate or suborbicular or subulate peltate. Lamina simple, deeply pinnatifid (or simple, trifid, palmatifid or pinnate), deeply lobed to the rachis; texture coriaceous or herbaceous, lower surface sometimes hairy, upper often glaucous, glabrous; main and lateral veins distinct; veinlets anastomosing to form irregular areolae with or without free included veinlets with swollen tips. Sori exindusiate, large, oval or round, in a row on either side of the main vein and one between the lateral veins or irregularly biseriate, superficial or slightly sunk; paraphyses simple, 2-7 celled, terminal cell often glandular. Spores bilateral, monolete, non-perinate, smooth, granulate or spiny.

**Key to Species**

- A. Lamina lobe with an entire margins or with remote incisions, one between each pair of main lateral veins; spores generally echinate..... 3. *P. oxyloba*
- B. Lamina lobes margin not entire (at least minutely or prominently serrate or toothed); spores generally non-echinate, smooth, reticulate, granulate..... B
- C. Rhizome thin, diam. 0.15-0.3 cm; rachis always glabrous.....C
- D. Rhizome thick, diam. 0.4-0.5 cm; rachis often hairy.. ..... D
- E. Lobes ovate-lanceolate, their bases not broad, very prominently and acutely serrulate, teeth mucronate, often spine scent, lowest pair drawn upwards 2. *P. malacodon*
- F. Lobes triangular-lanceolate, bases broad, minutely serrate or serrulate; lowest pair generally downwards deflexed .....4. *P. quasidivariata*
- G. Rhizome scales glossy, black; stipe and rachis sparsely scaly; lateral lamina lobes many, 5-10 (-20) pairs, as long as the terminal ones; pinnae at right angles to rachis.....1. *P. ebenipes*
- H. D. Rhizome scales matt; rachis sometimes scaly; lateral lobes few, 4-5 pairs, terminal lobe the largest pinnae pointing towards frond apex.....5. *P. stewartii*

*Pteris* L., Sp. Pl. 2: 1073 (1753); Gen. Pl. ed. 5: 484 (1754). Rhizome short, erect or creeping, scaly. Stipes base generally scaly. Lamina 1-2-pinnate, never finely dissected, herbaceous to coriaceous, glabrous, lowest pair of pinnae often forked near the base on basisopic side resulting in a long pinnule with its lobes similar to other pinnae; veins free or anastomosing to form a series of narrow areolae along the costae or costules; areolae without included veinlets.

Sori actually submarginal but as the margin curls back to form the indusium it becomes marginal, linear; indusia formed by reflexed pinna margin. Spores brown, tetrahedral, trilete, rarely bilateral, monolete, non-perinate, exine smooth, tuberculate or verrucose, the two surfaces have different types of ornamentation.

**Key to species**

- A. Lower acroscopic and basisopic veins fusing to form a series of costal areolae along the costae or costules, remaining veins free.....B
- B. Veins free.....C
- C. Fronds not very large; lamina pinnately compound.....2. *P. biaurita*
- D. Fronds large; lamina pedately compound.....10. *P. wallichiana*
- E. Lamina pinnate..... D
- F. Lamina 2-pinnatifid or 2-pinnate..... G
- G. Lowest pinnae not forked.....E
- H. Lowest pinnae forked at least once.....F
- I. Pinnae generally 3 (-7), lower never reduced; fronds dimorphic..... 7. *P. stenophylla*
- J. Pinnae numerous, lower gradually reduced,distant and sterile.. .....9. *P. vittata*
- K. Fronds on a rhizome few; pinnae many (3-10 pairs), broad 0.5-1.0 cm fertile,
- L. 1-2 cm sterile..... C
- ..... 3. *P. cretica*
- M. Fronds on a rhizome many; pinnae usually 3, rarely up to 7,
- N. narrow (0.3 cm broad).....4. *P. dactylina*
- O. Rhizome short-creeping; lowest pair of pinnae usually not forked; ultimate lobes long, falcate; sori extend from almost the base of the sinus to the apex of the pinna lobe.....H
- P. Rhizome erect; lowest pair of pinnae always forked at least once; ultimate lobes linear, oblong, short; sori never reaching the sinus but restricted to the middle of the pinna lobes.....I
- .....I
- Q. Fronds small; setae on costae and costules; veins free, simple or forked.6. *P. puberula*
- R. Fronds large; setae on costae; few veintets rarely anastomosing, veins free and forke.....5. *P. excelsa*
- .....5. *P. excelsa*
- S. Pinnae few, a large central terminal pinna with usually one, rarely two pairs of lateral pinnae.....8. *P. subquinata*
- .....8. *P. subquinata*
- T. Pinnae many, an apical pinna with 8-15 pairs of lateral ones.....1. *P. aspericaulis*
- .....1. *P. aspericaulis*

**ADIANTUM L.**, Sp. Pl. 2: 1094 (1753); Gen. Pl. ed. 5: 485 (1754).

Rhizome solenostelic or dictyostelic, erect, ascending, short or long-creeping. Stipes dark-brown to blackish, hairy or scaly or glabrous, generally glossy. Lamina 1-3-pinnate (or

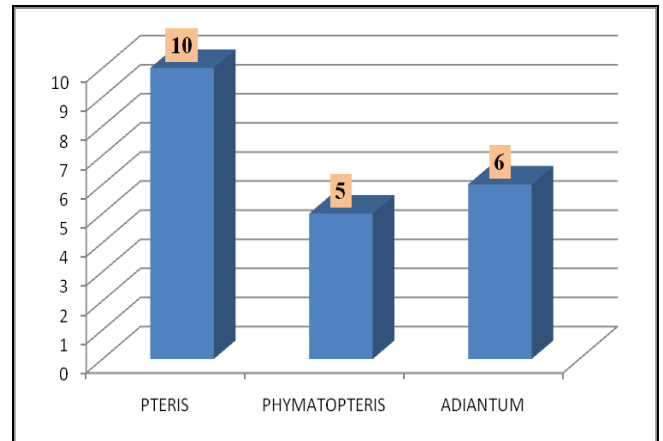
more), usually herbaceous or coriaceous, hairy or glabrous, rarely glossy; pinnae (or ultimate lobes) sessile or petiolate; veins usually free. Sori linear or globose, marginal, confluent or interrupted, short, absent at the sinus of the segment, present on the distal part of the veins, sometimes also between them on the lower side of the leaf-lobe which is exerted from the lamina margin and is sharply reflexed onto the indusium; indusia glabrous or hairy. Spores brown, tetrahedral trilete, non-perinate; exine smooth or granulate.

**Key to Species**

- A. Lamina pinnate; rachis usually extended at the tip and then with a terminal proliferous vegetative bud and small sized lateral pinna.....B
- B. Lamina more than 1-pinnate; rachis not extended at the tip;proliferous vegetative buds absent.....D
- C. Lamina hairy.....
- .....3 A. incisum
- D. Lamina glabrous.....C
- E. Pinnae large, few, 5-15 pairs, subdimidiate lunate, petiolate; petiole more or less peltately attached to the lower edgeof the pinna, outer margin entire or shallowly lobed; sori entire or interrupted according to the outer margin.....4. A. philippense
- F. Pinnae small, many, 15-20 pairs, triangular, dimidiate, shortly petiolate or nearly sessile, outer margin nearly straight or lobed into 3-5 truncate primary lobes with acute or sub-obtuse apex; sori on each lobe, never entire .....2. A. edgeworthii
- G. Rhizome erect; rachis dichotomously forked ..... 5. A. myriosorum
- H. D. Rhizome creeping; rachis not dichotomously forked..... E
- I. Pinnules large (1.5-2.0 cm), upper outer margin usually 3-6 lobed; sori one to each pinnule lobe1.....1. A. capillus-veneris
- J. E. Pinnules small (0.5 cm), usually 1 or 2 or rarely 3 sori to a pinnule.....6. A. venustum

**Table 1:** Distribution of species of dominated genus

Genus	Species
Adiantum (Adiantaceae)	A. incisum
	A. philippense
	A. edgeworthii
	A. myriosorum
	A. capillus-veneris
	A. venustum
Phymatopteris (Polypodiaceae)	P. oxyloba
	P. malacodon
	P. quasidivariata
	P. ebenipes
	P. stewartii
Pteris (Pteridaceae)	P. biaurita
	P. wallichiana
	P. stenophylla
	P. vittata
	P. cretica
	P. dactylina
	P. puberula
	P. excelsa
	P. subquinata
	P. aspericaulis



**Fig 1:** Graphical presentation of dominated genera and speies

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