

PTERIDOPHYTE FLORA OF RAMPAHAR AND SITAPAHAR RESERVE FORESTS UNDER RANGAMATI DISTRICT IN BANGLADESH

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Abstract

A taxonomic survey was conducted to study pteridophyte flora of Rampahar and Sitapahar reserve forests under Rangamati district in Bangladesh. The survey was accompanied with collection of voucher specimens of the available pteridophyte species in the area and deposition at Bangladesh National Herbarium as reference material. The study found 41 pteridophyte species belonging to 26 genera under 13 families from the area. It constitutes 21 per cent of total fern flora of the country including one threatened species *viz. Tectaria chattagramica* (Clarke) Ching.

Introduction

Rampahar and Sitapahar forests reserve is one of the richest botanical areas in the Chittagong Hill Tracts region which was declared as the first reserve forest in 1875 from this area. The under explored forests of Rampahar and Sitapahar areas represents tropical rain forest mainly of evergreen type of vegetation. The forests are situated in Kaptai Upazila under Rangamati district. Administratively, the area belongs to Kaptai Forest Range under the management of Rangamati South Forest Division. The forests lie between 22°26' and 22°38' North and 92°08' and 92°17' East and occupy an area of 966 hectares of hilly land. The configuration of the ground is very irregularly rugged and consists of a series of ridges and valleys running more or less from north to south. The level of valley bottoms ranges from 30 to 90 m above the sea level and maximum elevation is about 500 m. The hill soils are mainly yellowish-brown to reddish-brown loams and soil pH varies from 5.5-6.0⁽¹⁾. Though the area is very rich in species diversity but a comprehensive floristic study of the area is still lacking. Presently this natural forest is under enormous and persistent threats mainly due to different anthropogenic activities. As a result a number of economically important species/germplasm stocks have become endangered or threatened and perhaps extinct of a few. Therefore, it is essential to have an inventory of the forest wealth for conservation and sustainable management.

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Pteridophytes are a group of plants which demand attention from anyone who studies nature in Bangladesh, but this group of plants have been excluded from most cases of floristic studies. Prain⁽²⁾ was the first person who enumerated 98 taxa of fern from the then East Bengal (present Bangladesh) but nomenclature of those taxa has been changed much in the recent year. After the independence of Bangladesh, only a very few studies on fern flora have been done by Pasha and Mallick⁽³⁾, Pasha and Chakraborty⁽⁴⁾, Pasha⁽⁵⁾, Mirza and Rahman⁽⁶⁾, Uddin and Pasha⁽⁷⁾, Uddin⁽⁸⁾. Recently, Siddiqui *et al.*⁽⁹⁾ compiled 195 species of pteridophyte from Bangladesh. Most of those works were based mainly on survey of available literatures and examination of deposited voucher specimens at different herbaria. In Bangladesh, ecosystem/forest/habitat wise fern flora study attempt has been done by few (Uddin and Pasha)^(10,11). Hence, the floristic study of Rampahar and Sitapahar reserve forests was carried out aiming to generate baseline information for any conservation and management activity of the areas.

Materials and Methods

The present work deals with the pteridophyte species of Rampahar and Sitapahar forest areas and is based on the specimens collected through extensive field search. The floristic inventory was done by using area maps and regular field visits, accompanied by the collection of fertile specimens of all available plant species. A total of 19 botanical exploration tours were made during 2001-2008 and over 200 field numbers of plants were collected. The areas were visited in every month and the forest was reached by walking on foot following the existing forest trails. The herbarium specimens were examined for comparison at the Bangladesh National Herbarium, Dhaka University Salar Khan Herbarium and Bangladesh Forest Research Institute Herbarium. Collected specimens were identified by consulting Beddome⁽¹²⁾, Clarke⁽¹³⁾, Holttum^(14,15), Dixit⁽¹⁶⁾, Siddiqui *et al.*⁽⁹⁾ and Smitinand and Larsen.^(17,18) The specimens have been preserved at the Bangladesh National Herbarium (DACB). Fern families have been arranged according to the classification of Tagawa and Iwatsuki.⁽¹⁹⁾ The genera and species under each family have been arranged alphabetically. Each species has been furnished with valid name, full original citation, well-known synonym (in few cases), habit, ecology and representative specimen.

Results and Discussion

The present floristic study has identified following fern species from Rampahar and Sitapahar reserve forest areas.

SELAGINELLACEAE Willkom (1861).

1. ***Selaginella repanda*** (Desv.) Spring in Gaudich., *Voy Bonite Bot.* 1: 329 (1846). Erect or decumbent herb. *Commonly occurs in Rampahar and Sitapahar areas in shady and moist hill slopes. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 18 xii 2004, Sarder Nasir Uddin N-2601 (DACB).

2. **Selaginella tenera** (Hook. *et* Grev.) Spring in Bull. Acad. Brux. 10: 232 (1843). Erect herb. *Frequently occurs in both Sitapahar and Rampahar areas in shady and moist hill slopes. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 22 ix 2002, Sarder Nasir uddin N-1419 (DACB); Rampahar, Kaptai, 19 x 2003, Sarder Nasir Uddin N-2122 (DACB).
3. **Selaginella tenuifolia** Spring, Mém. Acad. Roy. Sci. Belg. 24 (2): 253 (1850). Erect herb. *Commonly occurs in both Sitapahar and Rampahar areas in shady and moist hill slopes. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 26 ix 2002, Sarder Nasir Uddin N-1609 (DACB); Rampahar, Kaptai, 16 x 2003, Sarder Nasir Uddin N-2051 (DACB).

EQUISETACEAE L. C. Richard *ex de* Candolle (1805).

4. **Equisetum debile** Roxb. *ex* Vouch., Monog. Prel.: 387 (1821). Creeping-rhizomatous, tufted herb. *Occasionally occurs in Rampahar area along the river banks, springs and in open grassy places. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 01 x 2002, Sarder Nasir Uddin N-1733 (DACB).

OPHIOGLOSSACEAE (R. Br.) Agardh (1882).

5. **Helminthostachys zeylanica** (L.) Hook., Gen. Fil.: t. 47b (1840). Rhizomatous herb. *Frequently occurs in both Sitapahar and Rampahar areas in shady forest beds. Representative specimens:* Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1703 (DACB); Sitapahar, Kaptai, 01 vi 2003, Sarder Nasir Uddin N-1999 (DACB).

MARATTIACEAE Berchtold *et* Presl (1820).

6. **Angiopteris evecta** (Forst) Hoffm., Comm. Soc. Reg. Sci. Gott. 12: 29, t. 5 (1796). Robust fern with erect stem. *Commonly occurs in Rampahar area along shady chhara. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1670 (DACB).

POLYPODIACEAE Berchtold *et* Presl (1820).

7. **Colysis pedunculata** (Hook. *et* Grev.) Ching in Bull. Fan Mem. Inst. Biol. 4: 321 (1933). Woody rhizomatous, creeping or climbing herb. *Rarely occurs in Rampahar area in shady and damp rocks. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1643 (DACB).
8. **Drymoglossum piloselloides** C. Presl, Tent. Pterid. 227, p. 10, f. 5, 6 (1836). *Pyrrosia piloselloides* (L.) Price (1974). Creeping, epiphytic herb. *Commonly occurs in both Sitapahar and Rampahar areas on tree trunks. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 23 ix 2002, Sarder Nasir Uddin N-1489 (DACB); Rampahar, Kaptai, 30 v 2003, Sarder Nasir Uddin N-1981 (DACB).

9. **Drynaria quercifolia** (L.) J. Sm. in Hook. J. Bot. 3: 398 (1841). Short creeping, epiphytic herb. *Frequently occurs in both Sitapahar and Rampahar areas on varieties of tree species. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 23 ix 2002, Sarder Nasir Uddin N-1481 (DACB); Rampahar, Kaptai, 30 v 2003, Sarder Nasir Uddin N-1962 (DACB).
10. **Microsorium pteropus** (Blume) Copel., Univ. Calif. Publ. Bot. 16: 112 (1929). Rhizomatous, epiphytic herb. *Commonly occurs in Rampahar area on shady and wet rocks along the streams. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 16 vi 2001, Sarder Nasir Uddin N-1009 (DACB).
11. **Microsorium punctatum** (L.) Copel., Univ. Calif. Publ. Bot. 16: 111 (1929). Rhizomatous, epiphytic herb. *Commonly occurs in Sitapahar area on tree trunks and mossy rocks. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 23 ix 2002, Sarder Nasir Uddin N-1491 (DACB).
12. **Pyrrosia lanceolatum** (L.) Farw., Amer. Midl. Nat. 12: 245 (1931). Creeping rhizomatous, epiphytic herb. *Commonly occurs in Rampahar area on tree trunks and moist rocks. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 03 x 2002, Sarder Nasir Uddin N-1818 (DACB).

SCHIZAEACEAE Kaulf. (1824).

13. **Lygodium flexuosum** (L.) Sw. in Schrad. J. Bot. 1800 (2): 106 (1801). Rhizomatous, climbing herb. *Frequently occurs in both Sitapahar and Rampahar areas in shady forest cover. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 24 ix 2002, Sarder Nasir Uddin N-1525 (DACB); Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1645 (DACB).

PTERIDACEAE Ching (1982).

14. **Adiantum philippense** L., Sp. Pl. 2: 1094 (1753). Tufted herb. *Commonly occurs in both Sitapahar and Rampahar areas on hill slopes or on crevices of rocks or walls. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 24 ix 2002, Sarder Nasir Uddin N-1547 (DACB); Rampahar, Kaptai, 03 x 2002, Sarder Nasir Uddin N-1805 (DACB).
15. **Ceratopteris thalictroides** (L.) Brongn. in Bull. Sci. Soc. Philom. Paris ser. 3, 8: 186 (1821). Aquatic, free floating or attached herb. *Rarely occurs in Sitapahar area in marshy places near river bank. Representative specimen:* Rangamati dist.: Sitapahar, 02 v 2008, Sarder Nasir Uddin N-2932 (DACB).
16. **Cheilanthes grisea** Blandford, J. Simla Nat. Hist. Soc. 1: 21 (1886). Rhizomatous, tufted fern. *Rarely occurs in Sitapahar area in open rocky areas. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 25 ix 2002, Sarder Nasir Uddin N-1569 (DACB).
17. **Doryopteris ludens** (Wall. ex Hook.) J. Sm., Hist. Fil.: 189 (1875). Long creeping, rhizomatous herb. *Occasionally occurs in Rampahar area in shady forest beds.*

- Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1626 (DACB).
18. **Onychium siliculosum** (Desv.) C. Chr. Ind. Fil. 20: 468 (1906). *Onychium auratum* Kaulf. (1824). Rhizomatous herb. *Less frequently occurs in both Sitapahar and Rampahar areas in shady forest beds. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 19 xii 2004, Sarder Nasir Uddin N-2646 (DACB); Rampahar, Kaptai, 07 i 2005, Sarder Nasir Uddin N-2701 (DACB).
 19. **Pityrogramma calomelanos** (L.) Link, Handb. Erken. Gew. 3: 20 (1833). Rhizomatous, tufted herb. *Occasionally occurs in Rampahar area in shady forest beds. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 07 i 2005, Sarder Nasir Uddin N-2702 (DACB).
 20. **Pteris ensiformis** Burm. f., Fl. Ind.: 230 (1768). Rhizomatous herb. *Frequently occurs in both Sitapahar and Rampahar areas in shady forest beds. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 23 ix 2002, Sarder Nasir Uddin N-1484 (DACB); Rampahar, Kaptai, 03 x 2002, Sarder Nasir Uddin N-1808 (DACB).
 21. **Pteris geminata** Wall. *apud* Hook., Spect. Fil. 1: 53 (1846). Rhizomatous, tufted herb. *Rarely occurs in Sitapahar area in shady forest beds. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 18 xii 2004, Sarder Nasir Uddin N-2609 (DACB).
 22. **Pteris griffithii** Hook., Sp. Fil. 2: 170, t. 123 A (1853). Rhizomatous herb. *Rarely occurs in Sitapahar area in shady hill slopes. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 19 xii 2004, Sarder Nasir Uddin N-2647 (DACB).
 23. **Pteris pellucida** Presl, Rel. Haenk. 1: 55 (1825). Rhizomatous herb. *Frequently occurs in Rampahar area in shady, bushy forests. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1671 (DACB).
 24. **Pteris venusta** Kunze in Bot. Zeit. 6: 195 (1868). Rhizomatous herb. *Rarely occurs in Sitapahar area in hill slopes. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 24 ix 2002, Sarder Nasir Uddin N-1527 (DACB).

VITTARIACEAE (Presl) Ching (1940).

25. **Vittaria elongata** Sw., Syn. Fil. 109, 302 (1806). Rhizomatous, tufted, epiphytic herb. *Occasionally occurs in Rampahar area on tree trunks. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 19 x 2003, Sarder Nasir Uddin N-2181 (DACB).

DENNSTAEDTIACEAE Pichi Sermolli (1970).

26. **Microlepia speluncae** (L.) Moore, Ind. Fil.: 93 (1857). Creeping, rhizomatous herb. *Commonly occurs in Sitapahar area in dry hill slopes and margins of forests. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 17 vi 2001, Sarder Nasir Uddin N-1051 (DACB).

THELYPTERIDACEAE Ching (1970).

27. **Thelypteris arida** (D. Don) Morton, Amer. Fern J. 49: 113 (1959). *Christella arida* (D. Don) Holtt. (1974). Long-creeping, rhizomatous herb. *Frequently occurs in Sitapahar area in grassy fields and waysides to hills. Representative specimen: Rangamati dist.: Sitapahar, Kaptai, 22 ix 2002, Sarder Nasir Uddin N-1440 (DACB).*
28. **Thelypteris crinipes** (Hook.) K. Iwats., J. Jap. Bot. 38: 315 (1963). *Christella crinipes* (Hook.) Holtt. (1974). Rhizomatous herb. *Less frequently occurs in Sitapahar area along streams. Representative specimen: Rangamati dist.: Sitapahar, Kaptai, 24 ix 2002, Sarder Nasir Uddin N-1523 (DACB).*
29. **Thelypteris cylindrothrix** (Rosenst.) K. Iwats. in Hara, Fl. E. Himal.: 482 (1966). *Christella cylindrothrix* (Rosenst.) Holtt. (1974). Long-creeping, rhizomatous herb. *Rarely occurs in Sitapahar area in shady forest beds. Representative specimen: Rangamati dist.: Sitapahar, Kaptai, 18 xii 2004, Sarder Nasir Uddin N-2602 (DACB).*
30. **Thelypteris nudata** (Roxb.) Morton, Contr. U. S. Nat. Herb. 38: 352 (1974). *Pronephrium nudatum* (Roxb. ex Griff.) Holtt. (1972). Creeping, rhizomatous herb. *Frequently occurs in Rampahar area in shady forest beds near springs. Representative specimen: Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1704 (DACB).*
31. **Trigonospora calcarata** (Blume) Holttum, Reinwardia 8: 506 (1974). *Nephrodium calcaratum* Hook. (1862). Rhizomatous, tufted herb. *Very rarely occurs in Sitapahar area on wet rocks near springs. Representative specimen: Rangamati dist.: Sitapahar, Kaptai, 17 vi 2001, Sarder Nasir Uddin N-1064 (DACB).*

ASPLENIACEAE Frank (1877).

32. **Asplenium nidus** L., Sp. Pl. 2: 1079 (1753). Rhizomatous, epiphytic herb. *Frequently occurs in Rampahar area on tree trunks or shady rocks. Representative specimen: Rangamati dist.: Rampahar, Kaptai, 16 x 2003, Sarder Nasir Uddin N-2035 (DACB).*
33. **Asplenium unilaterale** Lamk., Encycl. 3: 305 (1786). Rhizomatous herb. *Frequently occurs in Rampahar area on shady and wet rocks. Representative specimen: Rangamati dist.: Rampahar, Kaptai, 16 x 2003, Sarder Nasir Uddin N-2050 (DACB).*

DRYOPTERIDACEAE Ching (1941).

34. **Diplazium esculentum** (Retz.) Sw., Schrad. J. Bot. 1801 (2): 312 (1803). Rhizomatous, tufted herb. *Frequently occurs in Rampahar area in shady and moist places. Representative specimen: Rangamati dist.: Rampahar, Kaptai, 15 xii 2004, Sarder Nasir Uddin N-2531 (DACB).*
35. **Diplazium polypodioides** Blume, Enum. Pl. Jav.: 194 (1828). Long-creeping, rhizomatous herb. *Frequently occurs in Rampahar area on hill slopes, at forest edges.*

- Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1674 (DACB).
36. **Diplazium spectabile** (Wall. ex Mett.) Ching in Lingnam Sci. J. 15: 278 (1936). Creeping, rhizomatous herb. *Occasionally occurs in Sitapahar area in shady forest beds. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 06 i 2005, Sarder Nasir Uddin N-2684 (DACB).
37. **Pleocnemia irregularis** (Presl) Holttum, Kew Bull. 29: 347 (1974). *Tectaria irregularis* (Presl) Copel (1929). Rhizomatous herb. *Less frequently occurs in Rampahar area in shady, hill slopes of dense forests. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 16 x 2003, Sarder Nasir Uddin N-2077 (DACB).
38. **Tectaria chattagramica** (Clarke) Ching, Sinensia 2 (2): 35 (1931). Rhizomatous herb. *Rarely occurs in Rampahar area in lowlands and shady hill slopes, in evergreen forests. Representative specimen:* Rangamati dist.: Rampahar, Kaptai, 02 x 2002, Sarder Nasir Uddin N-1759 (DACB).
39. **Tectaria heterosora** (Bak.) Ching, Sinensia 2 (2): 35 (1931). Creeping, rhizomatous herb. *Commonly occurs in both Rampahar and Sitapahar areas along the springs, in hilly evergreen forests. Representative specimens:* Rangamati dist.: Sitapahar, Kaptai, 22 ix 2002, Sarder Nasir N-1417 (DACB); Rampahar, Kaptai, 30 ix 2002, Sarder Nasir Uddin N-1673 (DACB).
40. **Tectaria paradox** (Fee) Sledge, Kew Bull. 27 (3): 413 (1972). Rhizomatous, tufted herb. *Rarely occurs in Sitapahar area along the streams, in hilly evergreen forests. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 20 xii 2004, Sarder Nasir Uddin N-2651 (DACB).

LOMARIOPSIDACEAE Alton (1956).

41. **Bolbitis hookeriana** K. Iwats., Acta Phytotax. Geobot. 18: 49 (1959). *Bolbilis appendiculata* (Willd.) K. Iwats. (1959) subsp. *vivipara* (Hook.) HENNIPMAN (1970). Rhizomatous herb. *Less frequently occurs in Sitapahar area in evergreen and semi-evergreen forests. Representative specimen:* Rangamati dist.: Sitapahar, Kaptai, 22 ix 2002, Sarder Nasir uddin N-1420 (DACB).

Floristic study of Rampahar and Sitapahar reserve forests has recorded a total 41 pteridophyte species distributed in 26 genera and 13 families. Of which, one species is aquatic, eight species are epiphytic and 32 species are terrestrial. Analysis shows that four families *viz.* Pteridaceae (11 species), Dryopteridaceae (7 species), Polypodiaceae (6 species) and Thelypteridaceae (5 species) constitute more than 70 per cent of total fern flora of the area, whereas, remaining nine families constitute less than 30 per cent. The study has found that 17 species are confined to Rampahar area, 14 species are confined to Sitapahar and only 10 species occur in both Rampahar and Sitapahar areas. This indicates

that fern species are very much specific to their substrates or habitats. Among those species, *Tectaria chattagramica* (Clarke) Ching has been enlisted in Red data book by Khan *et al.*⁽²⁰⁾ The analysis also found that the study area (only 966 hactres of land) harbours 21 per cent of total fern flora of the country. Hence, it can be concluded that the area is an important habitat for fern species in the country.

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