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Some economic aspects of Ferns and Fern-allies of Seijosa Forest area of East Kameng District, Arunachal Pradesh

Acharya Balkrishna[1], Bhasker Joshi[1]*, Anupam Srivastava[1], Rama Shankar[1], B. K. Shukla[2], Sidharth Tiwari [1], Uday Bhan Prajapati[1], Amita Singh[1], Parul Punetha [1], Aashish Kumar[1], Aqib[1], Priyanka Tyagi[1], Sangam Sharma[1], Rajesh Kumar Mishra[3]

[1]Patanjali Herbal Research Department, Patanjali Research Foundation Trust, Haridwar, Uttarakhand, 249405
[2]Ex-SD, Botanical Survey of India, Central Regional Centre, 10 Chatham Lines, Allahabad, 211002
[3]MD Scholar, Dravyaguna Department, Patanjali Bhartiya Ayurvigyan Evum Anusandhan Sansthan, Haridwar, Uttarakhand, 249405, India
*Corresponding author's email: bhaskar.joshi@prft.co.in

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ABSTRACT

The present work is based on the study of Pteridophytes of Seijosa forest area, East Kameng District of Arunachal Pradesh lying between the foothills of Seijosa at an elevation of 300-550 m. Studies were carried out to collect, identify and document its ethnobotanical as well as other medicinal and economic uses. During the study period (2018-2019), seasonal field visits were carried out and a total of 50 ferns and fern-allies of different families were documented. The dominant families present were Pteridaceae, Polypodiaceae and Aspleniaceae. The study revealed different uses of ferns and fern-allies as food, fodder, in treatment of various diseases and as ornamental plants. This study may further help students and researchers of plant conservation, biodiversity, ethnobotany and pharmacology.

Key-words: Arunachal Pradesh, economic aspects, ferns and fern-allies, medicinal uses, Seijosa.

INTRODUCTION

Pteridophytes are known to humankind since the beginning of civilization as a source of green vegetables and medicinal plants. Caraka (3rd century BC) and Susruta (6th century BC) described uses of various pteridophytes in their Samhitas. Theophrastus (327-287 BC) and Dioscorides (50 AD) had also referred to the medicinal attributes of certain ferns. They were identified to have various ethnobotanical uses which could either be for food consumption, medicine and aesthetic value (Delos Angeles, 2012). They also provide food, fibre, crafts, building material, abrasives and of course decoration materials (Srivastava 2016). The pteridophytic flora of Indian region is very rich due to remarkable altitudinal variations ranging from coastal level to high mountain ranges (Joshi et al. 2018). In India about 67 families, 191 genera and more than 1000 species of ferns and fern-allies are present (Dixit 2000). Maximum number of diversity is found in Himalayas, Eastern and Western Ghats. The entire North East India

comes under Himalayan zone, and diversity of Pteridophytes is expected to be very high.

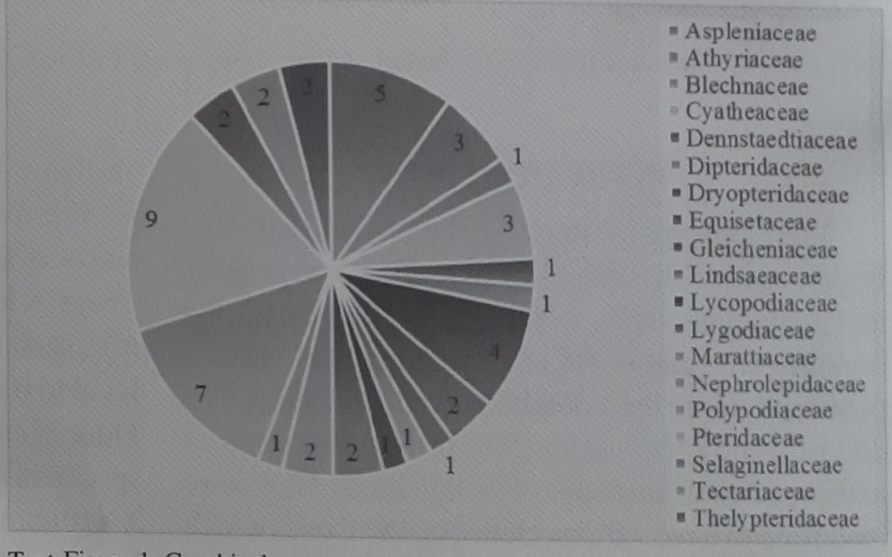
The present study encompasses around a list of about 50 ferns and fern-allies collected in Seijosa forest area, East Kameng District of Arunachal Pradesh during the 2018 survey, with their recent nomenclature and different uses. Various workers such as Panigrahi (1960), Panigrahi (1968), Rao & Hajra (1980), Baishya & Rao (1982), Jamir & Rao (1988), Shankar et al. (1994), Vasudeva (1999), Borthakur et al. (2001), Singh & Panigrahi (2005), Mannan et al. (2008), Benniamin (2010), Kumari et al. (2011), Shankar & Rawat (2012), Attaullah et al. (2017) and Yumkham et al. (2017) conducted detailed work on fern and fern allies of India including North Eastern India. Presently, due to deforestation and forest fire a number of taxa of ferns and fern-allies have been eradicated or lost (Benniamin 2011). In the present paper, an attempt is made to assess the economic aspects of Ferns and Fern-Allies of Seijosa Forest Area of East Kameng District, Arunachal Pradesh with their great potential as vegetables, medicine and various other economical uses.

MATERIAL AND METHODS

The present study was conducted in Seijosa forest area in East Kameng District of Arunachal Pradesh at an elevation of 300-550 m asl during 2018. During this study authors have collected more than 460 plant specimens belonging to 69 species of pteridophyes. Out of this, 50 species were used by natives as food, fodder, medicinal, ornamental and in ceremonial functions. Semi-structured questionnaire was adopted for data collection related to ethnobotany and compared with published literature representing different uses of pteridophytes throughout India. Identification of the plants were made as per available literature on various fern floras, research papers and through matching of the voucher specimens with the authentic records available on the Herbarium sheets of Kew, New York was done. Voucher specimens were deposited at Patanjali Research Foundation Herbarium (Acronym PRFH) Haridwar (Uttarakhand).

RESULTS AND DISCUSSION

The present study has been designed to assess the medicinal and other economical aspects of 50 species belonging to 19 families are described in this paper. Pteridaceae is the dominant family with 09 plants followed by Polypodiaceae (07), Aspleniaceae (05) and Dryopteridaceae (04) (Text-Figure 1). 43 ferns and fern-allies are used medicinally. The data collected show that majority of the drugs are taken orally. *Angiopteris helferiana* C. Presl, *Asplenium nidus* L., *Blechnum orientale* L, *Dicranopteris linearis* (Burm. f.) Underw., *Equisetum ramosissimum* subsp. *debile* (Roxb. ex Vaucher) Hauke, *Lycopodiella cernua* (L.) Pic. Serm., *Microsorum punctatum* (L.) Copel., *Nephrolepis cordifolia* (L.) C. Presl, *Pteris vittata* L., *Pyrrosia longifolia* (Burm. f.) C.V. Morton, *Pyrrosia piloselloides* (L.) M.G. Price and *Thelypteris dentata* (Forssk.) E.P. St. John are used in the treatment of various ailments such as skin disease, jaundice, malaria, bone fracture, urinary disorders, constipation, earache, cough and cold, sexual disorders, dysentery and rheumatism. People use these plants in different forms such as juice, extract, decoction, paste, etc. Also 27 species of ferns and fern-allies are used as food, fodder, ornamental and in ceremonial function. The ferns and fern-allies used commonly as ornamental plants are *Alsophila andersonii* J. Scott ex Bedd., *Angiopteris helferiana* C. Presl, *Asplenium finlaysonianum* Wall. ex Hook., *Asplenium nidus* L., *Asplenium nitidum* Sw., *Asplenium phyllitidis* D. Don, *Athyrium*



Text-Figure 1: Graphical representaton of economically important families

Angiopteris helferiana C. Presl

Asplenium nitidum Sw.

Blechnum orientale L.

Bolbitis heteroclita (C. Presl) Ching

Dipteris wallichii (R. Br.) T. Moore

Tectaria fuscipes (Wall.) C. Chr.

Plate 1

Alsophila gigantea Wall. ex Hook.

Diplazium esculentum (Retz.) Sw.

Pyrrosia longifolia (Burm. f.) C.V. Morton

Thelypteris dentata (Forssk.) E.P. St.John

Plate 2

Table 1: Economic Aspect of Some Ferns and Fern-Allies

S. No.	Plant Species	Family	Plant Parts Used	Medicinal Use	Other Uses
1	***Alsophila andersonii*** J. Scott ex Bedd.	Cyatheaceae	Whole plant		Ornamental Purpose. Core is dried, bark removed and powder thus obtained is used as a substitute for wheat flour.
2	***Alsophila khasyana*** T. Moore ex Kuhn	Cyatheaceae	Fronds		Used as an avenue plant. Stem is used as food. Fresh leaves are used as cattle feed and old leaves used for cattle bed.
3	***Alsophila gigantea*** Wall. ex Hook.	Cyatheaceae	Fronds, Rhizome	Inflammation, leucorrhoea and used against snake bite and in leucorrhoea.	Used as an avenue plant. Stem pith is used as food. Plant also used as ornamental.
4	***Angiopteris crassipes*** Wall. ex C. Presl	Marattiaceae	Stem, Fronds	Leucoderma	Edible, alcoholic drink prepared from stipules
5	***Angiopteris helferiana*** C. Presl	Marattiaceae	Whole Plant	Indigestion, dysentery and hair loss. Also in bowels related problems of cattle & goats.	Ornamental
6	***Asplenium dalhousiae*** Hook.	Aspleniaceae	Whole plant	Jaundice, typhoid, spleen diseases and eye disorders.	
7	***Asplenium finlaysonianum*** Wall. ex Hook.	Aspleniaceae	Roots	Dysentery	
8	***Asplenium nidus*** L.	Aspleniaceae	Whole plant	Skin disease, jaundice, malaria, fever, bone fracture and urinary disorders.	Ornamental
9	***Asplenium nitidum*** Sw.	Aspleniaceae			Ornamental
10	***Asplenium phyllitidis*** D. Don	Aspleniaceae	Fronds	Jaundice and fever	Ornamental
11	***Athyrium drepanopterum*** (Kunze) A. Braun ex Milde	Athyriaceae			Ornamental
12	***Blechnum orientale*** L.	Blechnaceae	Fronds, Rhizome	Urinary bladder complaints, worm infection and diaphoretic, also used as aperitif.	
13	***Bolbitis heteroclita*** (C. Presl) Ching	Dryopteridaceae			Ornamental for aquariums.
14	***Ceratopteris thalictroides*** (L.) Brongn.	Pteridaceae	Fronds	Skin diseases, wounds, stomachache and piles	Fronds used as vegetable curry and in aquariums as an ornamental.
15	***Dicranopteris linearis*** (Burm. f.) Underw.	Gleicheniaceae	Fronds, Rhizome	Asthma, inflammation, indigestion, throat pain, constipation and worm infection	Fronds used for local beverages; rachis for making mats, chairs, seats, baskets, belts, fishing trap, etc. Whole plant used in ceremonial function.

16	***Diplazium dilatatum*** Blume	Athyriaceae	Fronds	Diuretic	Young fronds are edible
17	***Diplazium esculentum*** (Retz.) Sw.	Athyriaceae	Rhizome, Fronds	Blood disorders, gout, constipation, earache, malaria fever, cough & cold	Young fronds used as vegetable.
18	***Dipteris wallichii*** (R. Br.) T. Moore	Dipteridaceae	Whole plant	Stomach ache, jaundice	
19	***Dryopteris sparsa*** (D. Don) Kuntze	Dryopteri-daceae	Whole plant	Worm infection	
20	***Dryopteris marginata*** Christ	Dryopteridace ae	Whole plant	Worm infection	
21	***Equisetum diffusum*** D. Don	Equisetaceae	Whole plant	Urinary problems, haemostatic, acidity, dyspepsia, bone fracture and hydrophobia	
22	***Equisetum ramosissimu m subsp. debile*** (Roxb. ex Vaucher) Hauke	Equisetaceae	Stem, Rhizome, Cones	Diuretic, bleeding, gonorrhoea, joint pain, fungal infection and kidney disorders	
23	***Hemionitis tenuifolia*** (Burm. f.) Christenh.	Pteridaceae	Rhizome	Abscess, giddiness & weakness, wounds	
24	***Leptochilus pteropus*** (Blume) Fraser-Jenk.	Polypodiaceae	Whole Plant	Cut and wounds	Ornamental
25	***Loxogramme involuta*** (D. Don) C. Presl	Polypodiaceae	Rhizome	Rheumatism, sprains, cuts, wounds, piles, scabies, ulcer, eczema, fever and gonorrhoea	
26	***Lycopodiella cernua*** (L.) Pic. Serm.	Lycopodiaceae	Rhizome	Nervous disorders, rheumatism, itching, cough & cold, leucorrhoea, fever and dropsy	Plant after drying used for filling pillows and ceremonial function.
27	***Lygodium flexuosum*** (L.) Sw.	Lygodiaceae	Rhizome, Fronds	Expectorant, scabies, ulcers, eczema, cough, gonorrhoea, rheumatism, cuts, wounds and as memory enhancer	
28	***Lygodium japonicum*** (Thunb.) Sw.	Lygodiaceae	Fronds	Food poisoning, diabetes, burn, urinary tract infection and expectorant	Beverages (herbal tea)
29	***Microlepia rhomboidea*** (Wall. ex Kunze) Prantl	Dennstaedtiac eae	Whole plant		Ornamental
30	***Microsorum membrana ceum*** (D. Don) Ching	Polypodi-aceae	Whole plant	Dysentery, diuretic, wounds, chest pain, cough & cold	
31	***Microsorum punctatum*** (L.) Copel.	Polypodiaceae	Fronds	Constipation, urinary disorders, snakebite, dysentery and for healing wounds	Food (vegetable); ornamental

32	***Nephrolepis cordifolia*** (L.) C. Presl	Nephrolepi-daceae	Rhizome, Fronds	Bacterial infection, cough & cold, fungal infection, jaundice, rheumatism, liver and skin disorders	Food (Vegetable); ornamental
33	***Odontosoria chinensis*** (L.) J. Sm.	Lindsaeaceae	Fronds	Intestine infection, urinary problems, cut & wounds	
34	***Onychium contiguum*** Wall. ex C.Hope	Pteridaceae	Whole plant	Urinary tract infection	Manure
35	***Polystichum aculeatum*** (L.) Roth ex Mert.	Dryopteri-daceae	Whole plant	Diarrhoea & dysentery	
36	***Pteris biaurita*** L.	Pteridaceae	Fronds	Sores & wounds, body pain, dysentery, body pain	
37	***Pteris cretica*** L.	Pteridaceae	Fronds	Cut & wounds	
38	***Pteris ensiformis*** Burm. f.	Pteridaceae	Rhizome, young fronds	Dysentery, bone fracture, glandular swelling of neck and menstruation	
39	***Pteris quadriaurita*** Retz.	Pteridaceae	Rhizome	Cut & wounds, boils, irregular menstrual cycle in female	
40	***Pteris vittata*** L.	Pteridaceae	Whole plant, Rhizome	High blood pressure, diarrhoea & dysentery, fever	Bioremediation of arsenic, ornamental
41	***Pteris longifolia*** L.	Pteridaceae	Rhizome, Fronds	Diarrhoea, blood dysentery, swelling, constipation	Food (tender fronds used as vegetable)
42	***Pyrrosia lanceolata*** (L.) Farw.	Polypodiaceae	Fronds	Cough & cold and sore throats	
43	***Pyrrosia longifolia*** (Bur m. f.) C.V. Morton	Polypodiaceae	Whole Plant	Pounded plant is applied to reduce labour pains during childbirth.	Ornamental
44	***Pyrrosia piloselloides*** (L.) M.G. Price	Polypodiaceae	Leaves	Bone fracture; fronds pounded with Gypsum is applied to irritating rashes and poultice for headaches	
45	***Selaginella uncinata*** (Desv. ex Poir.) Spring	Selaginell-aceae		Bacterial infection, liver infection, Brain tumor	It has very attractive appearance, especially due to the metallic blue iridescent caused by thin-film refraction.
46	***Selaginella wallichii*** (Hook. & Grev.) Spring	Selagine-llaceae	Whole plant	Protective medicine after child birth and cough	
47	***Tectaria polymorpha*** (Wall. ex Hook.) Copel.	Tectariaceae	Whole plant	Eczema & scabies, fever, worm infection	
48	***Tectaria fuscipes*** (Wall.) C. Chr.	Tectariaceae	Fronds		Food (young fronds are edible)
49	***Thelypteris prolifera*** (Retz.) C.F.Reed	Thelypteri-daceae	Fronds, Whole plant	Aperients, alterative, antiseptic	Food (tender fronds are cooked as vegetable)
50	***Thelypteris dentata*** (Forssk.) E.P. St.John	Thelypteri-daceae	Fronds	Swellings, rheumatism, blood vomiting, urinary disorders, insect repellent, wounds & cuts	

drepanopterum (Kunze) A. Braun ex Milde, *Bolbitis heteroclita* (C. Presl) Ching, *Leptochilus pteropus* (Blume) Fraser-Jenk., *Microlepia rhomboidea* (Wall. ex Kunze) Prantl and *Pyrrosia longifolia* (Burm. f.) C.V. Morton. The common ferns and fern-allies used as vegetables are *Ceratopteris thalictroides* (L.) Brongn., *Diplazium dilatatum* Blume, *Diplazium esculentum* (Retz.) Sw., *Microsorum punctatum* (L.) Copel., *Pteris longifolia* L., *Tectaria fuscipes* (Wall.) C. Chr. and *Thelypteris prolifera* (Retz.) C.F.Reed. Rachis of *Dicranopteris linearis* (Burm. f.) Underw. used for making mats, chairs, seats, baskets, belts, fishing trap. *Lycopodiella cernua* (L.) Pic. Serm. after drying used for filling pillows. After extensive survey various literatures pertaining to the different uses of pteridophytes was studied and has been presented in Table 1 along with their respective families, sources, parts used, medicinal and other economic uses. All the species are arranged alphabetically.

CONCLUSION

The present study is useful for ethnobotanists, phytochemists and pharmacologists working on medicinal ferns and fern-allies. Also economic aspect of this paper may increase the rural economy. The medicinal uses of these plants may also be utilized as an alternative source of drugs for the benefit of mankind without affecting the natural ecosystem. Conservation and cultivation of these ferns and fern-allies will help to maintain the ecological balance, traditional knowledge as well as livelihood security of local inhabitants. Hope this study will be helpful for natives and ethnobotanists for further critical investigation of medicinal and other economical uses of plants present in this area.

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