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Floristic Diversity of Ferns and Fern Allies of Lamgara Block, Almora, Indian Central Himalaya

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Abstract

Ferns and their allies constitute one of the most fascinating and ecologically significant groups of the plant kingdom. They form a prominent component of the vegetation of the Kumaun Himalaya, contributing greatly to its floristic diversity. The present investigation was undertaken to enumerate and document the floristic diversity of ferns and fern allies occurring in Jalna village of Lamgara block, Almora district, Uttarakhand. During field surveys conducted in 2022, the present authors collected a total of 23 species of ferns and fern allies from the study area. The majority of these species were found to prefer terrestrial habitats, while only a few exhibited epiphytic and lithophyte modes of growth. The present work also provides notes on the distribution of these species within India and across the world.

Keywords: Floristic diversity, Fern and ferns allies, Habitat preference, Indian Central Himalaya

1. Introduction

Pteridophytes 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 habitat in the plants (Das and Nath 2012). About 250 million years ago, they formed the dominant part of Earth's vegetation, but in the current scenario, flora has been largely replaced by the seed bearing plants. About 12,000 species of pteridophytes occur in the

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world flora of which more than 1000 species are distributed in different biogeographical regions of India with the main centers of the Himalayas. They are widely distributed to the wetter parts of the country, but are much less common, or even absent from very dry or severely cold regions (Benniamin 2012). They occur in abundance in tropical, subtropical, temperate and moist-deciduous forests of India.

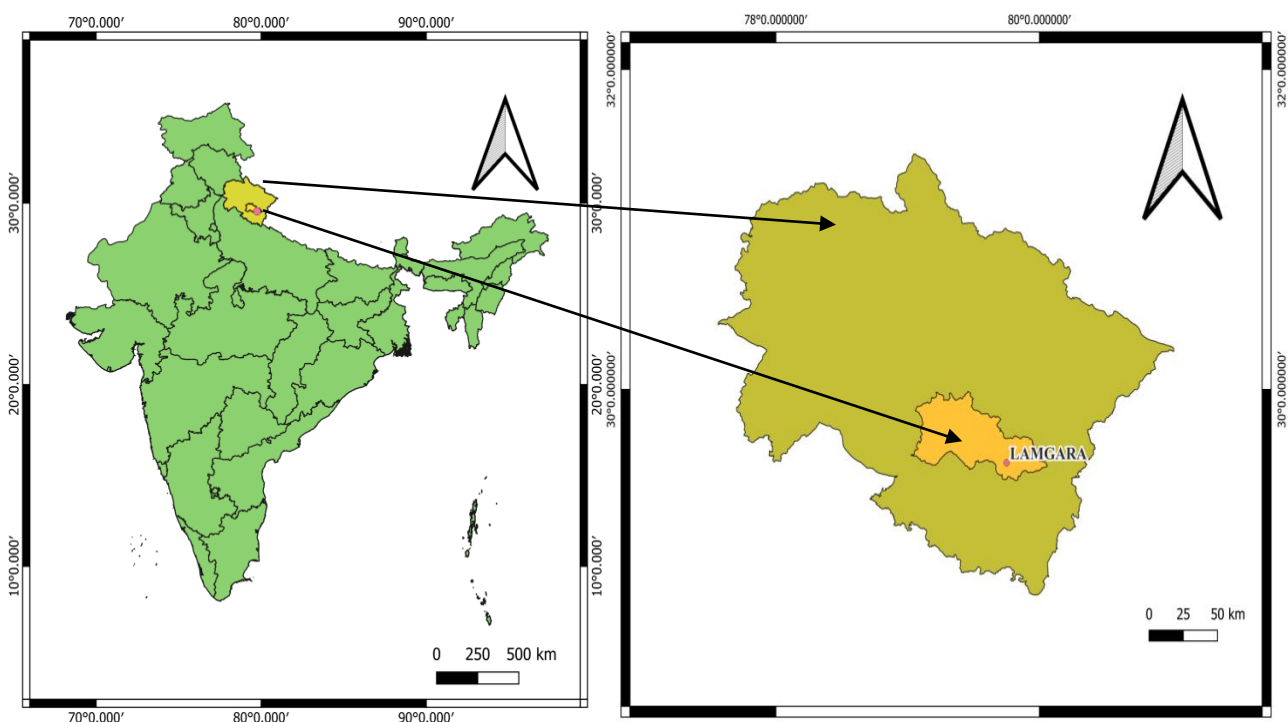
The diversity and distribution of pteridophytes are strongly influenced by various abiotic factors, including humidity, temperature, soil pH, altitude along with these abiotic factors human interference causes the loss of the habitats, which becoming a serious threat to the pteridophytes of the Himalayan regions.

2. Material and Methods

2.1 Study Area

Jalna is a small village in Lamgara block of Almora District situated at an altitude of 1675 meter. The study area has a temperate climate. Depending on the altitude of the area, there is a significant fluctuation in the weather, ranging from tropical to quite frigid. In the area, summers are nice but winters are cold, with snow on the peaks, and temperatures that are close to freezing.

The summer season runs from late March through the end of June and goes up to July. The rainy season begins in early July and lasts through September. The duration of this period is said to be favorable for collecting ferns. The winter season begins in late November or early December. The mountain's summit sees a lot of snowfall.



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Fig1. Map showing location of study area

The texture of the soil varies from location to place. The soil's texture gradually changes from the mountain's downhill slope to its rising peak. While plain areas and cultivated fields had deep, well-drained soil, the land towards the mountain had a clay loam texture.

Primarily the fern like soil, which is abundant in organic stuff. While few also require acidic soil, the majority prefer alkaline soil. Typically, they favor wetness but not water logging. Ferns need a soil that drains effectively. It is ideal to have soil that is sandy or humus with good drainage.

2.2 Collection and Identification of specimens

The current paper is the result of the authors' extensive plant survey in yare 2022. The plant specimens were gathered accompanied with comprehensive field data, including its habitat and locality. Specimens were identified with the help of available literatures on fern and ferns allies of west Himalaya (Kholia, 1995; Khullar, 1994, 2000 Pande and Pande, 2003; fraser-jenkins, 2015) or by consulting with taxonomic experts. Species within the genera and genera within the families were ordered alphabetically and the nomenclature of all the taxa has been updated. For the classification of species Fraser- Jenkins (2020) system of classification were followed

3. Result and Discussion

In the present study, **23 species of pteridophytes**, distributed across **19 genera and 10 families**, were documented from Jalna village of Almora District

Table1. List of Family, Genus and Species of Study Area

S.No	Species	Familes	Habitat
1	<i>Selaginella chrysocaulos</i> (Hook.Ex Grev) Spring	Selaginellaceae	Terrestrial
2	<i>Equisetum arvense</i> L.	Equisetaceae	Terrestrial
3	<i>Pteridium aquilinum</i> (L.) Kuhn	Dennstaedtiaceae	Terrestrial
4	<i>Adiantum capillus-veneris</i> L.	Pteridaceae	Terrestrial/ Lithophytes
5	<i>Adiantum incisum</i> Forssk.	Pteridaceae	Terrestrial/ Lithophytes
6	<i>Adiantum Venustum</i> D. Don	Pteridaceae	Terrestrial
7	<i>Aleuritopteris farinosa</i> (Forssk.) Fée	Pteridaceae	Terrestrial/ Lithophytes
8	<i>Onychium lucidum</i> (D.Don) Spreng.	Pteridaceae	Terrestrial

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9	<i>Pteris cretica</i> L.	Pteridaceae	Terrestrial
10	<i>Pteris pellucida</i> C.Presl	Pteridaceae	Terrestrial
11	<i>Pteris wallichiana</i> C.Presl	Pteridaceae	Terrestrial
12	<i>Asplenium trichomanes</i> Thunb.	Aspleniaceae	Terrestrial/ Lithophytes
13	<i>Thelypteris dentata</i> (Forssk.) E.P.St.John	Thelypteridaceae	Terrestrial
14	<i>Athyrium attenuatum</i> (C.B.Clarke) Tagawa	Woodsiaceae	Terrestrial
15	<i>Cystopteris fragilis</i> (L.) Bernh.	Woodsiaceae	Terrestrial/ Lithophytes
16	<i>Diplazium esculentum</i> (Retz.) Sw.	Woodsiaceae	Terrestrial
17	<i>Woodwardia unigemmata</i> (Makino) Nakai	Blechnaceae	Terrestrial
18	<i>Dryopteris filix-mas</i> (L.) Schott	Dryopteridaceae	Terrestrial
19	<i>Polystichum longipaleatum</i> <u>Christ</u>	Dryopteridaceae	Terrestrial
20	<i>Drynaria mollis</i> Bedd.	Polypodaceae	Epiphytes
21	<i>Goniophlebium argutum</i> (Wall. ex Hook.) Bedd.	Polypodaceae	Terrestrial
22	<i>Microsorium membranaceum</i> (D.Don) Ching	Polypodaceae	Terrestrial/ Epiphytes
23	<i>Polypodiodes lachnopus</i> (Wall. ex Hook.) Ching	Polypodaceae	Epiphytes/Lithophytes

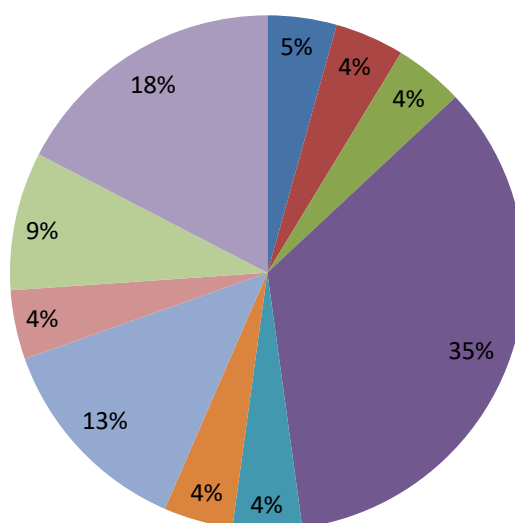
Among these 10 families, **Pteridaceae** was the most dominant family, comprising **8 species**, followed by **Polypodaceae** with **4 species**. Families such as **Woodsiaceae** represented by 3 species, **Dryopteridaceae** were represented by **2 species each**, while the remaining families—**Aspleniaceae**, **Blechnaceae**, **Dennstaedtiaceae**, **Equisetaceae**, **Selaginellaceae**, and **Thelypteridaceae**—were represented by a single species each. This distribution pattern indicates a comparatively higher diversity within the families Pteridaceae and Polypodaceae in the study area.

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Proportional Representation of Pterisophytic species within the Families

■ Selaginellaceae ■ Equisetaceae ■ Dennstaedtiaceae ■ Pteridaceae
 ■ Aspleniaceae ■ Thelypteridaceae ■ Woodsiaceae ■ Blechnaceae
 ■ Dryopteridaceae ■ Polypodaceae



1. Selaginellaceae Willk.

The family represented by 01 genus.

Selaginella P.Beauv.

Genus *Selaginella* represents by 01 species.

Selaginella chrysocaulos (Hook.Ex Grev) Spring.

Ecology: Grow either on clay soil or in the shade of a forest.

General Distribution: India, China, Pakistan, Malaysia and Nepal.

Distribution in India: Uttarakhand, Kerela, Assam.

2. Equisetaceae Michx ex DC.

The family represented by single Genus.

Equisetum L.

Genus *Equisetum* represented by single species

Equisetum arvense L.

Ecology: Found to growing in moist soil.

General Distribution: Distributed in India, China, Nepal, and Bhutan.

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Distribution in India: Uttarakhand, Odisha.

3. Dennstaedtiaceae lot.

The family represents by 01 Genus.

Pteridium (Gled ex Scop.)

Genus *Pteridium* represented by a single species.

Pteridium aquilinum (L.) Kuhn

Ecology: It prefers to grow in Open spaces.

General Distribution: Nepal, Pakistan, China, India, Sri-Lanka.

Distribution in India: Uttarakhand (Kumaun and Garhwal, South India, Jammu and Kashmir and Himachal Pradesh.

4. Pteridaceae Ching.

The species represented by 04 genera.

(i) *Adiantum(L.)*

Genus *Adiantum* represented by 03 species.

(i) *Adiantum capillus-veneris L.*

Common name:-Southern maidenhair fern.

Ecology: Thrives in damp, shaded environment

General Distribution: Pakistan, Nepal, China, Shri-Lanka.

Distribution in India: Uttarakhand (Both Kumaun and Garhwal), Jammu and Kashmir, Darjeeling and South India.

(ii) *Adiantum incisum* Forssk.

Ecology: Both terrestrial and lithophyte, grows near boulder bases or in rocks.

General Distribution: Nepal, China, Sri-Lanka, and Pakistan.

Distribution in India: Uttarakhand(Both Kumaun and Garhwal), Sikkim, Himachal Pradesh, Jammu and Kashmir.

(iii) *Adiantum venustum D.Don.*

Common name:-Evergreen Maidenhair.

Ecology:-It is slow growing plant that typically flourishes on damp rocks and humus rich soil.

General Distribution:-Nepal, China, Afghanistan and Pakistan.

Distribution in India:-Uttarakhand(Both Kumaun and Garhwal), Jammu and Kashmir, Himanchal Pradesh.

(ii) *Cheilanthes Sw.*

Genus *Cheilanthes* represented by 01 species.

Aleuritopteris farinosa (Forssk.) Fée

Ecology: It prefers to grow along roadside and uncovered walls of stone that are damp.

General Distribution: Pakistan, India, China, Sri-Lanka,

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Distribution in India: Uttarakhand, Jammu and Kashmir, Rajasthan, South India.

(iii) *Onychium Kaulf.*

Genus *Onychium* represented by 01 species.

Onychium lucidum (D.Don) Spreng.

Ecology: Commonly develop beside waterways.

General Distribution: Mainly in China and India,

Distribution in India: Uttarakhand (mainly in Kumaun), both Eastern and Western Himalayan regions.

(iv) *Pteris (L.)*

Genus *Pteris* Represented by 03 species.

(i) *Pteris critica* L.

Ecology: Moist and Shady forest floor.

General Distribution:-India, Nepal, Bangladesh, Australia, Sri Lanka.

Distribution in India: In India it distributed in Uttarakhand, Jammu and Kashmir, Uttar Pradesh, Madhya Pradesh, Rajasthan and Kerala.

(ii) *Pteris pellucida* C.Presl.

Ecology:-Grown in arid and gloomy environment.

General Distribution: India, Sri-Lanka, Nepal and Malaya.

Distribution in India: Uttarakhand (both Kumaun and Garhwal), Shikkim, Meghalaya.

(iii) *Pteris wallichiana* C.Presl.

Ecology: This ubiquitous fern can be found in wide area throughout the forest.

General Distribution: India, Nepal, China, Japan and Myanmar.

Distribution in India: Uttarakhand (In both Kumaun and Garhwal), Himachal Pradesh, Meghalaya and Assam.

5. Aspleniaceae (Newman).

The family represented by 01 genus.

Asplenium (L.)

Genus *Asplenium* is represented by single species.

Asplenium trichomanes Thunb..

Ecology: Grows in Wet and moist environment with moderate to full shade.

General Distribution: America, Nepal, Pakistan, Turkey, Europe, Iran and India.

Distribution in India: East and west Himalaya

6. Thelypteridaceae Ching Ex Pichi Sermolli.

The family represented by 01 genus.

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(i) *Thelypteris* Schmidel.

Genus *Thelypteris* represented by 01 species.

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

Ecology: Terrestrial plant grows in exposed grasslands.

General Distribution: Australia, Asia, New-Zeland, Africa and India.

Distribution in India: Uttarakhand, Karnataka and Odisha.

7. Family Woodsiaceae (Diels) Herter

The family represented by 03 Genus.

(i) *Athyrium* Roth.

Genus *Athyrium* is represented by 01 species.

Athyrium attenuatum (C.B.Clarke) Tagawa

Ecology: Thriving in wide open grass fields.

General Distribution: India, Pakistan, and Nepal.

Distribution in India: Uttarakhand (Both Kumaun and Garhwal, Himanchal Pradesh, Kashmir.

(ii) *Cystopteris* Bernh.

Genus *Cystopteris* Represented by 01 species.

Cystopteris fragilis (L.) Bernh.

Ecology: Moist and Shady places, both Terrestrial or Lithophyte.

General Distribution: China, Japan, Bhutan, New Zealand, Pakistan.

Distribution in India: Uttarakhand, Jammu and Kashmir, Nagaland.

(iii) *Diplazium* (Sw.)

Genus *Deplazium* is representes by 01species.

Diplazium esculentum (Retz.) Sw.

Ecology: Frequently observed in low-altitude areas near water system.

General Distribution: Nepal, China, Japan, India, Sri-Lanka.

Distribution in India: Both Kumaun and Garhwal, Sikkim, Himachal Pradesh, Nagaland.

8. Blechnaceae Linn

The family represented by 01 Genus.

Woodwardia J.Smith

Genus *Woodwardia* is represented by single species.

Woodwardia unigemmata (Makino) Nakai

Ecology: A very prevalent species discovered in open regions. Usually it favors growing along sloppy rocks.

General Distribution: Nepal, China, Bhutan, Japan, Philippines.

Distribution in India: It grown in Uttarakhand (Kumaun), Himachal Pradesh, Sikkim, Jammu and Kashmir

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9. Dryopteridaceae Herter.

The family represented by 02 genera.

(i) Dryopteris Adans.

Genus Dryopteris represents by 01 species.

Dryopteris filix-mas (L.) Schott.

Ecology: Evergreen fern. It prefers moist and shaded areas.

General Distribution: Asia, North America and Europe.

Distribution in India: Uttarakhand (both Kumaun and Garhwal and Himachal Pradesh).

(ii) Polystichum Roth.

Genus polystichum represented by 01 species.

Polystichum longipaleatum Christ.

Ecology: Plant lives on the wet, dark, gloomy forest floor.

General Distribution: India, China and Nepal.

Distribution in India: Uttarakhand (both Kumaun and Garhwal region and Himachal Pradesh).

10. Family polypodiaceae J. Presl and C. Presl

Family represented by four Genera.

(i) Drynaria Smith

Genus Drynaria represented by single species.

Drynaria mollis Bedd.

Ecology: Very common Epiphytic species.

General Distribution: India, Nepal and China.

Distribution in India: Uttarakhand (Both Kumaun and Garhwal) and Himachal Pradesh.

(ii) Microsorium Link.

Genus Microsorium represented by single species.

Microsorium membranaceum (D. Don).

Ecology: Growing mainly shaded forests and trunks of host plant.

General Distribution: India, China, Nepal, Sri Lanka, Philippines.

Distribution in India: Uttarakhand, Jammu and Kashmir, Meghalaya, Himachal Pradesh and Myanmar.

(iii) Goniophlebium (Blume) C. Presl

Genus Goniophlebium represented by single species.

Goniophlebium argutum (Wall. ex Hook.) Bedd.

Ecology: Growing as both lithophytes and epiphytes.

General Distribution: India, Nepal, China.

Distribution in India: Kumaun, Kashmir, Himachal Pradesh, Sikkim.

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(iv) *Polypodiodes ching*

Genus *Polypodiodes* represented by single species

Polypodiodes lechnopus (Wall ex Hook) Ching.

Ecology: Growing as both Epiphytes and Lithophytes in open rocks.

General distribution: Indian, Nepal and China

Distribution in India: Uttarakhand (Both Kumaun and Garhwal), Jammu and Kashmir, Assam, Nagaland and Eastern Himalaya.

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