

## ASSESSMENT OF THE ECO- DISTRIBUTION AND STATUS OF FERNS OF DARJEELING, WEST BENGAL

**Amitabala Patra**

Research Scholar

Commerce & Management

Asian International University Imphal, Manipur

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### Abstract

*Three Darjeeling ferns—*Athyrium filix-femina*, *Dicranopteris linearis*, and *Pleopeltis macromarpa*—were investigated for their antibacterial properties. The fronds, rachis, and rhizomes of fresh ferns were dried. The extract was made with ethanol. Using disc diffusion, the antibacterial activity of these extracts was examined against gram-positive (*Bacillus megaterium*) and gram-negative (*Escherichia coli*) bacteria. Although the rhizome and frond extracts were the most active, all three ferns exhibited antibacterial activity. *Dicranopteris linearis* showed the most activity against both gram-negative and gram-positive bacteria, while *Athyrium filix-femina* rhizome extract exhibited the highest activity against the former. Out of the three ferns, the extract from the fronds of *Pleopeltis macromarpa* was the most efficient against both gram-positive and gram-negative bacteria. some results suggest that some ferns could be inherently antimicrobial.*

**Keywords:** *ferns, antibacterial activity, *Athyrium filix-femina*, *Dicranopteris linearis*, *Pleopeltis macromarpa*, Darjeeling*

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### 1. INTRODUCTION

Cycles of species extravagance and distribution have been analyzed in ecology. To all the more likely comprehend elevational inclinations and species wealth and think up systems for biodiversity security that are viable with environmental change, ongoing exploration has investigated these points. The inclination and ordered class impressively affect height and species lavishness. Variety designs incorporate a level at low heights, a top in the mid-rise district that is tolerably rich, and a steady decrease in animal varieties extravagance with rise. Contrasted with monotonically falling patterns, mid-rise bends are more pervasive, and almost 50% of the investigations that have been done have viewed as one. Various factors

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impact the species wealth of rise inclinations. Most ecologists accept that slope species distribution is affected by environmental change.

Liang et al. (2020) tracked down that species extravagance over the Tibetan Level (TP) rise angle is preferred explained by environmental change over by other ecological elements. Given its relationship with height, environment might play an essential part in molding species extravagance and distribution along altitudinal slopes. Environment changes prompted an expansion in species wealth because of geology and level. In this manner, understanding the cycles fundamental species extravagance along height slopes is fundamental for surveying what environmental change means for biodiversity. Taking into account altitudinal slopes and climatic factors, local area ecologists have set up various speculations to look at species lavishness and its controllers. The distribution of mountain plants can be impacted by climatic circumstances like temperature, dampness, evapotranspiration, length of developing season, and sun radiation. This study evaluated the impacts of water and energy on the species lavishness of TP ferns. The most famous and questionable hypothesis explaining varieties in greenery species lavishness is classified "the energy-water speculation." In light of plants' obtaining of water and energy, plant species have concentrated on water, energy, and species extravagance.

## **2. ECO- DISTRIBUTION AND STATUS OF FERNS OF DARJEELING, WEST BENGAL**

Darjeeling, West Bengal, has a wealth of ferns and other greenery. Vascular plants that recreate through spores are called ferns. Under soggy, concealed conditions, they cycle nitrogen, give home to creatures, and maintain the dirt.

Darjeeling's geology, environment, and soil all influence the distribution of ferns. Ferns flourish at 100 and more meters above ocean level. Woodlands at lower heights are subtropical, while those at higher elevations are mild. Darjeeling ferns are hurt by overexploitation, deforestation, environmental change, and living space misfortune. The woods are under strain from framework, the travel industry, and farming. Environmental change is making certain plant species move uphill looking for sufficient natural surroundings. Darjeeling ferns should be preserved. Protection of territory, sustainable land use, and indictment of unlawful collecting are a couple of models. The assurance of ferns can be aided by open mindfulness and instruction.

### 3. RESEARCH METHODOLOGY

Rhizomes, rachis, and fronds are accumulated in various areas in Darjeeling, West Bengal. From that point onward, the examples are dried for three to five days utilizing a hot air stove set at 400°C. Particles are delivered by dried examples. To make rhizome, rachis, and frond separates, powdered examples are absorbed ethanol, a natural dissolvable. Five grams of powder are utilized for every example and extraction, and twenty milliliters of dissolvable are utilized in three 100 milliliter tapered flagons. To stop vanishing, cup lips are loaded down with cotton that is impervious to fluid and lubed. It requires about a day to shake the carafes at room temperature (370 degrees Celsius). Whatman Concentrates are shaken for an entire day prior to being separated through No. 1 channel paper. The circle dissemination method is utilized to evaluate sifted concentrates' antibacterial properties against both gram-positive and gram-negative microorganisms on a supplement agar plate (Baur et al. 1966). To assess the viability of the antimicrobial specialist, standard gram-positive and gram-negative examples, like E. Coli and Bacillus megaterium, are utilized. This work includes making another bacterial culture medium with 106 cells for every millilitre and making 6-millimeter circles on supplement agar for a dispersion examine. Sterile refined water is used as a control. Estimations and investigations are made of the inhibitory zone measurements following a 24-hour hatching period at 370F. For each investigation, three duplicates are made. One can utilize the Lowry et al. (1951) strategy to quantify protein.

### 4. RESULTS

The antibacterial action of three explicit ferns — *Athyrium filix-femina*, *Dicranopteris linearis*, and *Pleopeltis macromarpa* — is displayed in Tables 1, 2. The outcomes show that the antibacterial action of Gramme (+) and Gram(-) microorganisms is great. Rhizome and frond separate from these three plants have antibacterial properties. Rhizome and frond have adequate measures of antimicrobial synthetics. The most antibacterial concentrates come from the rhizome and fronds of these plants. The antibacterial action of rachis separates is lower than that of frond extricates. The most elevated movement of Gram (-)ve microbes is found in the rhizome concentrate of *Athyrium filix-femina*. less intense concentrate from rachis. Moreover, antimicrobial against Gram-negative microbes is frond extricate. These concentrates don't neutralize Gramme (+) microscopic organisms by any stretch of the imagination. The most elevated action of gram (-) and gram (+) microscopic organisms was

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found in the rhizome concentrate of *Dicranopteris linearis*. less intense concentrate from rachis. Both gram-positive and gram-negative microorganisms answer well to frond remove. Frond separate from *Pleopeltis macromarpa* shows the most noteworthy movement of gramme (+) and gram (- ) microscopic organisms. less intense concentrates from rachis. Phenomenal movement against gramme (+) and gram (- ) microorganisms is shown by rhizome separate.

**Table-1: Antibacterial activity of *Athyrium filix-femina***

Name of the test organism.	Zone of inhibition					
	Rhizome	Rachis	Frond	Control(mm)		
<i>Escherichia coli</i>	12.3MM	8.5MM	9.6MM	A	M	E
				6.5	6.6	6.4
<i>Bacillus megaterium</i>	9.2MM	7.2MM	8.6MM	6.3	6.5	6.2

**Table-2. Antibacterial activity of *Dicranopteris linearis***

Name of the test organism.	Zone of inhibition					
	Rhizome	Rachis	Frond	Control(mm)		
<i>Escherichia coli</i>	11.3MM	9.2MM	10.3MM	A	M	E
				6.3	6.2	6.4
<i>Bacillus megaterium</i>	10.3MM	9.6MM	10.2MM	6.2	6.3	6.4

## 5. CONCLUSION

The antibacterial properties of three fern species—*Athyrium filix-femina*, *Dicranopteris linearis*, and *Pleopeltis macromarpa*—from the West Bengali Darjeeling region were investigated. The results demonstrated the potent antibacterial activity of all three ferns, with

the rhizome and frond extracts exhibiting the highest activity. While *Athyrium filix-femina* rhizome extract was more effective against gram-negative bacteria, *Dicranopteris linearis* rhizome extract showed the highest effectiveness against both gram-positive and gram-negative bacteria. The most efficient frond extract against both types of bacteria was found in *Pleopeltis macromarpa*, out of the three ferns that were the subject of the investigation. These findings, which suggest that these ferns may be used as natural antibacterial agents, highlight the importance of these plants in pharmaceutical and ethnobotanical research.

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