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AN ANALYTICAL INVESTIGATION OF FLORISTICTIC DIVERSITY FOR BIOPROSPECTING LICHENS

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ABSTRACT

From ancient times, lichens have been considered a veritable "treasure chest" of natural goods due to their wide variety of applications. Traditions of using lichens in the kitchen, as medicine, in the perfume and dying industries, in brewing and distilling, and as decorative accents date back centuries.In nature, lichen metabolites serve a wide variety of purposes, including but not limited to: weathering rocks; protecting the photobiont from harmful UV rays; recycling nutrients; limiting herbivore damage; and maintaining the symbiotic balance.In addition to providing nutrition for animals, lichens are also used as human food by several societies. Certain lichen species are eaten only in times of hunger, while others are eaten as a staple meal or even as a delicacy due to their high nutrient content. Researchers looking into the matter have found that the high carbohydrate content of lichens is what makes them so appealing as a food source. Lichens, despite their low protein concentration, have some potential as a protein replacement. Because of their low fat content and high crude fiber content, lichens are an excellent dietary source.

KEYWORDS: Floristictic Diversity, Bioprospecting Lichens, recycling nutrients, food source, high nutrient content

INTRODUCTION

In addition to their nutritional significance, several species of lichen have shown to have major commercial utility in the fields of cosmetics, fragrance, and as key sources of colors for apparel,

particularly among the ancient Greeks, Romans, and Native Americans. There are many uses for lichens in the modeling world, including but not limited to trains and ships.

Extracellular production of a range of secondary compounds of relatively low molecular weight crystallized on the hyphal cell walls contributes to the lichens' wide variety of uses; these compounds can make up as much as 0.1 to 10% or even 30% of the dry weight of the thallus. The chemistry of lichens has been studied and has revealed the presence of anywhere from 800 to 1050 compounds, of which only 550 have been described because of their rarity.

Lichens have been widely used as a vital component in several medicinal practices. Lichens have been utilized in Indian, Chinese, Homeopathic, and Western herbal therapy since before the invention of modern pharmacological therapies. From ancient times, lichens have been used to cure a wide variety of conditions, including but not limited to: arthritis, alopecia, constipation, cough, jaundice, kidney illnesses, leprosy, pharyngitis, rabies, infection, worm infestation, and hair loss. Analgesic, anti-inflammatory, anti-microbial, antioxidant, anti-proliferative, anti-pyretic, antiviral, and cytotoxic characteristics have all been seen in lichens. Very few lichens have been found to have anti-tumor action, and even fewer have been shown to have in vitro inhibitory effects on HIV.

However, lichens' sluggish growth rate and frequently severe environmental conditions have compelled them to create defensive compounds that can act as antigrowth, antiherbivore, or antibacterial agents.Phenolic metabolites, mainly usnic acid and anthraquinoneendocrocin, are responsible for lichens' antibacterial effects.

For example, lichens are a type of creature that may have antioxidant capabilities. By interacting with free radicals, scavenging free radicals, and chelating the free metallic catalysis, antioxidants limit or postpone the destruction of biomolecules or cells, as well as illnesses generated owing to an imbalance between intracellular antioxidants and intracellular reactive oxygen species (ROS). Many disorders, including heart disease, atherosclerosis, and chronic inflammation, are linked to the so-called condition of oxidative stress. Although organisms are able to guard against oxidative stress by creating antioxidants during aerobic cell respiration, additional antioxidants are typically necessary. In recent years, lichens have gained attention for the flavonoids and phenolic secondary compounds they contain. Submerged fermentation of the lichen species Usneacomplanata

produces usnic acid and psoromic acid, two compounds with potent cardiovascular protective and antioxidative action. Anticancer activity and hydroxyl radical scavenging activity in lung cancer (A549) and breast cancer (MCF-7) model cell lines are demonstrated for compounds isolated from Parmotremareticulatum.

Bioprospecting lichens for novel causes

This cryptogam has attracted a lot of attention from scientists for its potential in the synthesis of bioactive nanoparticles, in addition to the many medicinal benefits of lichens. The remarkable optical and electrical characteristics of gold nanoparticles, also known as gold colloids, and their applications in optoelectronic devices, drug delivery, biosensing, and catalysis have garnered a great deal of attention. Gold nanoparticles (AuNPs) are ideal for bioimaging, biomedical therapeutic, and biodiagnostic applications due to their surface plasmon resonance feature. To treat a wide range of illnesses, gold ashes have long been regarded as a staple of ancient Indian Ayurvedic therapy. Excellent antioxidant and antibacterial capabilities are also shown in surface-functionalized gold nanoparticles.

As they include phytochemicals that can operate as natural reducing agents with high competence, biomaterials including algae, bacteria, fungus, and other plant components have been suggested as eco-friendly nano-factories.

Only seldom have lichens been used for the production of noble metal nanoparticles. Metal ions may be neutralized by the unique metabolites found in lichen extracts such depside, depsidon, dibenzofurane, homo-D-glucan, and others. The secretion of Steptococcusmutans virulence factors like acid production, ATPase, enolase, protease, total exopolysaccharide content, and glucosidase was found to be inhibited by a herbo-metallic colloidal nano-formulation containing Swarna nanoparticles synthesized from a polyphenols rich lichen extract of Usnealongissima. Although harmful chemicals and costly physical procedures are now accessible, green-mediated production of gold nanoparticles from lichens can emerge as a viable alternative.

Due to the challenges in acquiring sufficient amounts and purities for structural elucidation and pharmacological testing, relatively few lichen compounds have been evaluated for biological activity and medicinal potential.

Floristictic diversity of lichens of Manipur

India takes up a major chunk of South and Southeast Asia, one of the world's six biogeographic regions. Conditions favorable to biodiversity had been created by geological processes operating on the country's landmass.

Moreover, the country's position between three evolutionary hotspots (originating in Gondwanaland, moving to northern Eurasia, and eventually receiving an inflow from Africa and Ethiopia) resulted in a wide range of edaphic conditions, phytoclimatic conditions, and bio-geographical zones.

As the country's landscape varies so greatly, from the permanently snowy peaks of the Himalayas to coastal plains, wetlands, mangroves, islands, tropical rain forests, rich alluvial plains, scorching deserts, and high altitude frigid deserts, the country's flora reflects this diversity. The region's diverse ecosystem necessitated the creation of three distinct ecological zones (Himalayan mountain system, Peninsular-Indian sub-region and the Tropical evergreen forests or Indo-Malayan sub region). In order to evaluate the hitherto unrecognized plant riches of a country, studies on floristic accounts of the country have assumed growing significance.

One of India's most unique phytogeographic zones is the Eastern Himalayan region, which includes the North- Eastern states. Due to its vast topography and different climatic circumstances, the region genuinely presents a greater picture of structural variety of flora, making it a focus of special attention among botanists and several of the world's major conservation agencies.

One-third of India's biodiversity can be found in the country's north-eastern area, which is an integral element of the Indo-Myanmar hotspot, Indo-Chinese, and Indian bio-geographical realms and thus a gateway for the country's rich flora and fauna with the rest. Of of the country's total of 15,000 known plant species, 8,000 are found only in the northeastern area; this includes a quarter of the country's 54 species of gymnosperms, 500 of the 1012 species of pteridophyes, and 825 of the 1145 species of orchid. In addition, this area constitutes a sizable chunk of India's richest lichenogeographic zone. Among India's total 2303 lichen species, 1162 are found in this area. While the North Eastern states are home to a wide variety of lichens, our understanding of their

floristic composition is limited since so much of the region remains undiscovered. Located in India's far northeast, Manipur is one such area. The high degree of endemism in the state's flora is a result of the large percentage of land area covered by trees (approximately 77.12%, or 17,219 square kilometers). Non-timber forest products abound as well, with over 300 recognized and identified species of medicinal plants, in addition to 54 species of bamboo and 4 species of cane.

The state's diverse topography, mild winters, and abundance of lichens, mosses, and liver-worts are all thanks to its extreme range in altitude. Little on floristic accounts of lichen variety had been carried out via perfunctory collecting, therefore the plant resources of Manipur, especially lichen species, remained untapped.

While lichens are genetically and phenotypically diverse, they are often overlooked by locals. This is likely due to a lack of awareness of the countless benefits that lichens might provide. There is, however, a paucity of data on the use of lichens for regional air quality monitoring. In order to achieve sustainable development at this time of greatest peril, bioprospecting of lichen richness is essential. To evaluate and reevaluate the floristic diversity and species richness of lichens in this region, morpho-taxonomic study of lichens has become very necessary, to be followed by study on basic and applied aspects. For ecological sustainability, it is also important to spread information on bioprospecting lichen riches.

CONCLUSION

Lichens are a type of self-supporting fungal, algal, or cyanobacterial association that serves as a repository for new compounds and genes because of its ecological need and stability. Studies on lichens have been largely ignored in the past, despite the fact that they are among the first land colonists of terrestrial ecosystems and can resist a succession of disastrous events of the earth. In recent years, however, lichen floristic researches have expanded significantly in response to the necessity to evaluate the country's plant riches. Manipur is a state that has not been completely studied for its lichen abundance, despite being classified as a "treasure trove" of old and unusual flora due to its richness in diversity and variability of species, such as these uncommon nonvascular cryptogamic lichens.

Locations were chosen because of differences in lichen distribution and richness. Despite their adaptability, lichens' presence in the forest is influenced by local sources of disturbance such as roads, farms, and habitat fragmentation, which in turn influence microclimate factors such as precipitation, temperature, moisture status, light intensity, and nutrients. The taxonomic composition and distribution in central Manipur were described, as was their phytogeographic associations.131 lichen species from 47 genus and 22 families were counted during a survey of the lichen diversity in central Manipur. The Parmeliaceae family has the most recorded genera and species, followed by the Graphidaceae family, while the Candelariaceae, Chrysothricaceae, Coccocarpaceae, Ectolechiaceae, Haematommataceae, Letrouitiaceae, Nephromataceae, and Pilocarpaceae families each show only a single genus and species. Of the plant families found in the Eastern Himalayas, Parmeliaceae is the most abundant, with 115 of the 199 species found in India (or 57.8%). There are 47 lichen genera documented in the central region of Manipur. Parmotrema, Graphis, Pyrenula, and Heterodermia were the most often reported genera, with fifteen, ten, and nine species, respectively. The genera which are represented by single species are Baculifera, Buellia, Candelaria, Chrysothrix, Coccocarpia, Lopadium, Fissurina, Haematommata, Hyperphyscia, Lecidea, Letrouitia, Lithothelium, Micarea, Mycobilimbia, Nephroma, Canoparmelia, Parmelinella, Phaeographis, Phyllopsora, Ramalina, Graphidastra and Thecaria.

REFERENCES

1. Behera BC, Verma N, Sonone A, and Makhija U (2007). Tissue Culture of some lichens and screening of their antioxidant, antityrosinase and antibacterial Properties. *Phytother. Res*.; 21: 1159–1170.

2. Behera BC, Verma N, Sonone A, and Makhija U (2008). Antioxidant and antibacterial properties of some cultured lichens. *Bio-resourceTechnology*; 99: 776–784.

3. Bélanger MC (1834- 38). Voyage aux IndesOrientales. Années 1825- 29. Botanique, II. Parite, Cryptogamie par Ch. BélangeretBordy de St. Vincent. Paris. Pp 113- 144.

4. Benn MH, Lorimer SD, and Perry NB (1998). *Phytochemistry*; 47(8): 1649 – 1652.

5. Bertsch A and Butin H (1967). Die Kultur der Erdflechte*Endocarponpusillum*imLabor. *Planta* 72: 29-42.

6. Blackwell WH (1990). Poisonous and Medicinal Plants, Prentice-Hall, Englewood Cliffs, p. 103.

7. Borchardt JK (1999). Combinational biosynthesis panning for pharmaceutical gold. *ModernDrug Discovery*; 2(4): 22- 29.

8. Boustie J, Tomasi S, and Grube M (2010). Bioactive lichen metabolites: alpine habitats as an untapped. *Phytochem. Rev*.; 10:287–307.

9. Brodo MI, Sharnoff SD, and Sharnoff S (1999). Lichens of North America. Yale University Press, New Haven and London, pp. 721–723.

10. BroutaF,Descamps F, Monod M, Vermout S, Losson B, and Mignon B (2002). Secreted metalloprotease gene family of *Microsporumcanis*. *Infect Immun*.; 70: 5676-5683.

11. Brunauer G, Hager A, Grube M, Turk R, and Stöcker-Wörgötter E (2007). Alterations in secondary metabolism of aposymbiotically grown mycobionts of *Xanthoriaelegans* and cultured resynthesis stages. *Plant Physiology and Biochemistry*; 45: 146- 151.

12. Burkholder PR and Evans AW (1945). Further studies on the antibiotic activity of lichens. *Bull. Torrey Bot. Club*; 72:157-164.

13. Burkholder PR, Evans AW, McVeigh I, and Thornton HK (1944). Antibiotic Activity of Lichens. *Proceedings on National Academic Science*, USA; 30(9): 250-255.

14. Cabanes FJ, Theelen B, Castella G, and Boekhout T (2007). Two new lipid- dependent *Malassezia* species from domestic animals. *FEMS Yeast Research*; 7(6): 1064–1076.

15. Cafarchia C, Latrofa MS, and Figueredo LA (2011). Physiological and molecular characterization of atypical lipid-dependent *Malassezia* yeasts from a dog with skin lesions: adaptation to a new host? *Medical Mycology*; 49(4): 365–374.

16. Candan M, Yilmaz M, Tay T, and Kivanc M (2006). Antimicrobial activity of extracts of the lichen *Xanthoparmeliapokornyi* and its gyrophoric and stenosporic acid constituents. *Z Naturforsch* C; 61:319–323.

17. Cardarelli M, Serino G, Campanella L, Ercole P, De Cicco-Nardone F, Alesiani O, and Rossiello F (1997). Antimitotic effects of usnic acid on different biological systems. *Cell. Mol. Life Sci.*; 53: 667–672.

18. Carlin G (1987). On the use of chemical characters in lichen taxonomy. *Graph. Scr*.; 1: 72-76.

19. Carneiro-Leao AMA, Freitas BD, Iacomini M, Gorin PAJ, and Oliveira MBM (1997). Cytotoxic effect against HeLa cells of polysaccharides from the lichen *Ramalinacelastri*. *Journal of Submicroscopy Cytology and Pathology*; 29: 503–509.

20. Chauhan R and Abraham J (2013). *In vitro* antimicrobial potential of the lichen *Parmotrema* sp. extracts against various pathogens. *Iran J Basic Med Sci*; 16(7): 882-885.