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Review Paper

Extraction Phytochemical Characterisation and Neuro-pharmacological In vivo Activity of Acrostichum aureum Leave

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ABSTRACT

Background: Acrostichum aureum is an edible mangrove fern predominantly found in tropical and subtropical regions across the globe. This review aims to provide a comprehensive overview of the plant's traditional uses phytochemical composition, and pharmacological activities. Objective: The mangrove fern Acrostichum aureum is being increasingly researched for its neuro-pharmacological properties, particularly regarding anxiety management. Its rich composition of flavonoids, alkaloids, and terpenoids is believed to be the source of these potent bioactive effects.Method: To investigate the ethnobotanical, phytochemical, and pharmacological profiles of the plant, a comprehensive search of database – including Google Scholar, PubMed, Science Direct, and Research Gate – was performed. Additionally, the study outline the plant's nutritional and pharmaceutical potential and identifies key research gaps. Result: Acrostichum aureum acts as a potent pharmacological agent, with chemical studies identifying beneficial compounds like tannins, saponins, and flavonoids. These inflammatory, antibacterial, and anti-viral properties used to treat wounds, tumors, and various digestive and respiratory ailments.Conclusion: Acrostichum aureum is a highly valuable medicinal plant with broad therapeutic potential, driven by a rich phytochemiccal profile that includes flavonoids, alkaloids, and terpenoids. Its high phenolic content provides significant antioxidant, antibacterial, and anti-inflammatory effects, validating its traditional use for treating skin infections, ulcers and respiratory issues. Consequently, this plant serves as a promising natural resource for future drug discovery and clinical applications...

INTRODUCTION

Research suggests that the survival of *Acrostichum aureum* and Rhizophora apiculata in tough, high-salinity mangrove environments is aided by allelochemicals that suppress competitors [1]. Mangrove ecosystems serve as a natural

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pharmacy, providing inexpensive secondary metabolites with the potential to treat a wide range of diseases. These plants have developed these complex chemical defences to withstand the stressors of their coastal environments. Scientists are now exploring these novel compound of new therapeutic applications, with a specific focus on the fern *Acrostichum aureum*. Belonging to the pteridaceae family, it represents the only of group of ferns adapted to life in the intertidal zone [2]. Standing up to 4m tall, the Golden Leather Fern (Acrostichum aureum) is a striking presence in the mangrove understory. Its thick, upright stalks are covered in protective scales and carry dozens of leathery, net-veined leaves. When it comes time to reproduce, the undersides of its fertile leaves turn a rich, rustly brown, releasing large, four-sided spores. White beautiful, the plant is remarkably resilient; it can quickly aprout from underground rhizomes to take over cleared land. This "weedy'" nature makes it a formidable obstacle for foresters trying to clear space for the planting of commercial Rhizophora trees [3]. *Acrostichum aureum* L. is the sole species found along the Kerala coastline of India growing in association with mangrove. This robust, perennial herb is characterised by large, pinnately compound fronds, with fertility restricted to the distal pinnae . The species is chemically diverse containing significant active compound such as alkaloids, saponins ,tannins,sterols, and triterpenoids. It also features specific constituent like patriscabratine, tetracosane, ponasterone, pterosterone, kaempferol, quercetin, and sulphate protein.[4] Seven mangrave species (including Acrostichum aureum, Aegiceras corniculatum, Bruguiera gymnorrhiza, Cynometra ramiglora, Hibiscus tiliaceus, Pandanus foetidus, and Xylocarpus moluccensis) were harvested from tidal forests in the coastal Sundarbans –a swamp region within the Ganges delta- and other areas in the Khulna district of Bangladesh for cytotoxic activity screening. With the exception of Cynometra ramiflora, all these plant are utilized in Bangladeshi traditional medicine to treat various ailments, including cancer, inflammation and infectious diseases.[5] The transition from preliminary cell line studies in vivo modelling is crucial for the Malaysian botanical industry. Following the findings of Herman et al (2013) regarding NH/3T3 fibroblast recovery, researchers evaluated the healing potential of *Acrostichum aureum* aqueous extract. These tests specifically compared the efficacy of stem, leaf, and rhizome derivatives to establish a basis for new local product formulations[6] .Various mangrove species are utilized by traditional practitioners to treat chronic and common illnesses, such as asthma, diabetes, skin infections, and fever, underlining the importance of sustainable management and conservation [7]. Mangrove are rich in medicinal compound derived from secondary metabolites. Research on Avicennia marina confirms that these antioxidants include alkaloids and flavonoids. Furthermore, studies on Sonneratia caseolaris fruit demonstrate a synergistic correlation between total polyphenol concentration and antioxidant capacity. Beyond antioxidants, species like Nypa fruticans have been evaluated for beta- carotene and phenolic acid levels, while Bruguiera gymnorrhiza has proven effective as an antidiabetic agent in vivo. Similarly, ceriops tagal extract has beem shown to influence insulin production, and fruit flour from Rhizophora mucronata lam. Exhibit both antidiarrheal properties and the ability to stabilize blood glucose levels [8]. The aqueous extract (400 mg/kg) showed notable anti-anxiety affects in the EPM, evidenced by increased open arm exploration on days 1and 4 (4-hour mark) compared to controls. However, this therapeutic action was transient, with no significant improvements found on day 7, despite initial efficacy[9]. Phytochemicals serve as a plant's

natural defense system against external threats and harsh conditions. These compound are highly valued in medicine for their biological activities, such as fighting inflammation and bacteria. The plant *Acrostichum aureum* is particularly dense in secondary metabolites like tannins, sterols, and triterpenoids, making it a subject of pharmacological interest [10]. Preliminary phytochemical analysis of *Acrostichum aureum* identified glycosides, proteins, triterpenoids , and saponins within the petroleum ether extract. The chloroform extract contained proteins, glycosides, and steroids, whereas the ethyl acetate extract was found to harbour proteins, glycosides, steroids, and flavonoids. Finally, the methanolic extract tested positive for a broad range of compound, including proteins, glycosides, steroids, triterpenoids, saponins, and flavonoids. [11]. Saponins and triterpenes/phytosterols were the only consistently present compound. Notably, hexane extracts were found to be devoid of alkaloids, flavonoids, glycosides, and tannins, containing only triterpenoids/phytosterols. In contrast, the simplicized grain exhibited a more diverse profile, including flavonoids, glycosides and tannins. The mongrave Fern contains vital phenolic compounds known for their therapeutic potential against atherosclerosis, diabetes, and cancer. Its flavonoids content, including kaempferol and quercetin, serves as a defense against obesity and oxidative stress. Documented bioactivities of the fern range from anti-inflammatory and anti-tumor to antiviral and antibacterial effects[12].

Plant Profile:

Table 1: General information on *Acrostichum aureum* [14]

Kingdom	Plantae
Subkingdom	Tracheobionta
Phylum/Division	Pteridophyta
Class	Filicopsida
Order	Polypodiales
Family	Petridaceae
Genus	Acrostichum
Species	Aureum
Common Names	Golden leather Fern, paku laut, mangrave fern, coarse swamp fern, piairaya, larat, pia



Figure 1. *Acrostichum aureum* .L.[28]

Benefits

Acrostichum aureum Linn. An edible mangrove fern common in tropical and subtropical regions, is highly valued for its diverse medicinal properties. Traditionally , it has been used as a global remedy for conditions like wounds, boils, snakebites, and respiratory issues like asthma and sore throats. It also serves as a natural treatment for digestive ailments, including constipation and worm infection, as well as more complex issues like elephantiasis.[28]

Profiling of Bioactive Phytoconstituents

Essentially natural plant defense mechanisms, phytochemicals are bioactive substance that safeguard flora from environmental challenges and predators. These compounds, which include polyphenos and carotenoids, act as essential protective agents UV light, disease, and pathogens, ensuring the plant's survival and resilience in harsh conditions[14]. Nutritional analysis reveals A. Aureum crosiers are rich in fiber, moisture, and key minerals like copper (19% ARD), along with significant levels of vitamins A, C, and B7. With vitamin A exceeding 100% of the RDA, this fern act as potent, safe nutrient source that aids in preventing micronutrient deficiencies [15]. Mangrove species are rich in secondary metabolites, particularly terpenoids (16.25%), tannins (12.5%), and steroids (10.0%), which are essential for surviving high-salilnity environment. These compounds, which also include alkaloids (9.38%), flavonoids (8.75%), saponins (8.75%) and glycosides (8.13%), contribute significantly to the potent antioxidant, antimicrobial, and antitumor activities reported in various studies [16]. Preliminary screening of *Acrostichum aureum* showed varying phytochemical compositions based on solvent extract. Petroleum ether extract indicated the presence of triterpenoids, saponins, glycosides, and proteins, while chloroform extract highlighted proteins, glycosides, steroids. Furthermore, ethylacetate extracts contained flavonoids, steroids, glycosides, and proteins, whereas methanolic extract were found to contain the broadest range, including flavonoids, triterpenoids, saponins, steroids and glycosides [17]. Because superoxide radicals serve as precursors to more aggressive reactive species like hydroxyl radicals and hydrogen peroxide, they directly contribute to lipid, protein, and DNA damage. Thus, evaluating a plant extract's ability to scavenge superoxide radicals is a crucial method for defining its overall antioxidant potential[18]. Phytochemical screening of *Acrostichum aureum* (commonly known as Mayur-sikha) reveals a rich, diverse range of compound, which explain its traditional medicinal uses. The analysis highlights the prevalence of flavonoids and phenols as primary bioactive constituent. Other, more specific tests identified the presence of saponins and tannins in varying concentration, depending on the solvent used for extraction. Notably, while phenolic components were abundant, steroidal compound were found, but not in every extract type [19]. The aqueous extract underwent phytochemical screening to identify its primary secondary metabolites. Standard qualitative tests were employed to detect the presence of flavonoid, saponins, tannins, and organic acids . Additionally the analysis screened for alkaloids, anthraquinones, cardiac glycosides and steroids. [20].

Pharmacological activity

Beyond its traditional ethnobotanical uses, Acrostichum aurem demonstrates significant pharmacological potential, with various extracts exhibiting antioxidant, anti-inflammatory, analgesic, cytotoxic, contraceptive, and wound-healing properties [21]. Known as the mangrove fern or golden leather fern *Acrostichum aureum* Linn is a resilient plant found in the brackish water of Nigeria and mangrove swamps worldwide. Belonging to the pteridaceae family, this fern is a staple in traditional healing. Locally, Nigerians utilize it to soothe migraines and digestive issues. Beyond Nigeria's borders, the plant serves as a versatile remedy for everything from snake bites and skin infections to mere complex ailments like haemorrhoids and dysentery. [22]. A water extract of *Acrostichum aureum* affectively protects the stomach against alcohol-induced ulcer. It works by reducing harmful free radical, increasing protective antioxidants in the stomach, dual action on both oxidative stress and inflammation dose-dependently prevents damage to the gastric

tissue.[23]. Recognized for its wide- ranging biological activities- such as antioxidant and analgesic effects- *Acrostichum aureum* stand out as a promising candidate for modern pharmacology. This research highlights the plant's significance in indigenous diets, where it serves as both nourishment and medicine. Through an investigation of its nutritional makeup and anxiolytic potential, the study seeks to safeguard traditional knowledge while offering communities new ways to enhance health and combat dietary gaps. [24]. Acrostichum aureum, a nutrient-rich mangrove fern, is widely recognized for its potent medicinal properties, including antioxidant, anti-inflammatory, and antimicrobial activities. This study investigates the nutritional and anxiolytic potential of the plant , assessing its ability to act as a therapeutic agent in animal models. By validating its nutritional and pharmaceutical value, the research aims to preserve traditional knowledge and benefit communities through improved health and new therapeutic option. [25]. An investigation of A. Aureum and A. Speciosum rhizome extracts (5%and 10%in aqua cream) was conducted by Herman et al.(2013)to evaluate their healing efficiency on inter-scapular wounds in rats. The study revealed that A. Speciosum was more effective than A. Aureum, with the 10% formulation producing the best result. A.speciosum is currently known solely for its wound- healing activity. (26). Thriving in harsh saline environments, mangroves are not only unique coastal plants but also, as studies have shown, rich sources eg medicinal extracts with significant antimicrobial properties. These bioactive molecules, which offer effective lower-toxicity, and environmentally friendly solutions to human disease management, are increasingly recognized for their potential. Consequently, both mangroves and their associated plants are being actively investigated for their diverse therapeutic applications [27].The search for better Acetylcholinesterase (AChE) inhibitor for Alzheimer's disease, which minimize side effects, is still a major focus in pharmacological research. Recent studies highlight potential new sources, uncluding sporothrin A from Sporothrix sp. (#4335). And two terphenyl compound from Penicillium chermesinum (ZH4-E2),both of which are acetylcholinesterase inhibition

Neuropharmacological activity

The neuropharmacological evaluation of *Acrostichum aureum* extracts was conducted using the pentobarbital- induced sleeping time test, following the method established by Williamson et al.. Twenty mice were randomized into four groups, with the test groups receiving the extract at 250and 500mg/kg, alongside a positive control (diazepam 1mg/kg, i.p.) and a negative control (1% Tween 80). After 30 minutes, all mice were administered pentobarbital sodium (20 mg /kg, i.p.) to initiate anaesthesia. The latency to sleep onset and the total sleeping duration were recorded for comparison.[29]

Safety

The scarcity of safety information on A. Aureum – both in vitro and vivo – highlights a critical research gap. To ensure safety, toxicological studies must be conducted to determine safe usage dosage for humans and animals. [24]

CONCLUSION

Acrostichum aureum (often referred to in the context of mangrove) grows abundantly among mangrove forests along the coastal areas of India, In Goa, this fern species is found inhabiting low-lying puddles, lake-sides, and the areas surrounding coconut plantations. *Acrostichum aureum*, a mangrove fern traditionally used to treat various ailments, possesses significant medicinal potential derived from its rich phytoconstituents. Phenols and flavonoids identified within the plant

act as crucial bioactive compounds that combat oxidative stress. These phytochemical contribute to potent antioxidant, anti-inflammatory, and antimicrobial activities, supporting the plant's use in healing wounds, ulcers and other diseases through free radical scavenging. Mangrove conservation has become a global priority, driven by the recognition of their significant, scientifically proven medicinal properties. Phytochemical analysis reveals that these plants, particularly the mangrove fern, are rich in secondary metabolites. Ethnomedicinal studies show that these species-with rhizomes used to treat atubborn ulcers and leaves applied as an amollient-offer a wide range of therapeutic application and their chemical profiles are directly influenced by their specific habitats.

REFERENCES

1. Ultari A. A review: study of chemical content, bioactivity of mangrove fern plants (Acrostichumaureum L.)
2. Akinwumi KA, Abam EO, Oloyede ST, Adeduro MN, Adeogun YA, Uwagboe JE. Acrostichiumaureum Linn: traditional use, phytochemistry and biological activity. Clinical Phytoscience. 2022 Nov 1;8(1):18.
3. Kimura N, Kainuma M, Inoue T, Chan EW, Tangah J, Baba K, Oshiro N, Okamoto C. Botany, uses, chemistry and bioactivities of mangrove plants V: Acrostichumaureum and A. speciosum. ISME/GLOMIS Elect J. 2017;15(1):1-6.
4. Bhatia M, Priti UP, Madhusoodanan PV. Studies on the gametophyte development and reproductive behavior of Acrostichumaureum L. Int J Plant Reprod Biol. 2017;9(2):89-92.
5. Uddin SJ. Cytotoxicity Screening of Bangladeshi Medicinal Plants and Isolation and Structural Elucidation of Novel Anti-cancer Compounds from Acrostichumaureum.
6. Herman HP, Susanti D, Saad S, Taher M, Ramli N. Wound contraction and epithelisation effects of Acrostichumaureum L. in rabbits. Journal of Pharmacy. 2022 Jul 31;2(2):59-68.
7. Saradar B, Mandal S, Kumar S. Ethnobotanical inventory and medicinal potential of mangrove flora in the Sundarbans, West Bengal, India. Journal of Biodiversity and Conservation. 2024;8(1):1-6.
8. Basyuni M, Mubaraq A, Aznawi AA, Sari SP, Ayu SM, Wahyuni T, Siregar ES, Slamet B, Sumarga E, Larekeng SH, Agustina NA. Edible and medicinal uses of mangroves in Indonesia with a systematic review on blue food potential and health benefits. Discover Sustainability. 2025 Oct 23;6(1):1140.
9. Vaz DA, Fernandes S, Arondekar A. Acrostichumaureum linn (crosiers): Unveiling nutritional content, phytochemical composition and anxiolytic activity through preclinical studies. Journal of Research in Pharmacy. 2025 Jan 9;29(5):1959-71.
10. Raja S, Ravindranadh K. Preliminary phytochemical screening of different solvent extracts of whole plant of Acrostichumaureum. World Journal of Pharmaceutical Sciences. 2014 Dec 1:1753-9.
11. Roy AK, More P, Prasad S, Chouhan K, Ghatuary S. A Review on Phytochemical Constitutions and Pharmacological activities of AcrostichumAureum. International Journal of Innovations in Science, Engineering And Management. 2025 Nov 28.
12. Ultari A. A review: study of chemical content, bioactivity of mangrove fern plants (Acrostichumaureum L.).
13. Basyuni M, Sari DP, Illian DN, Jayusman, Hasibuan PA, Nuryawan A, Sumardi. Phytochemical, physicochemical, and microscopic analysis of five true mangrove leaves. InAIP Conference Proceedings 2019

Jul 3 (Vol. 2120, No. 1, p. 030006). AIP Publishing LLC.

14. Roy AK, More P, Prasad S, Chouhan K, Ghatuary S. A Review on Phytochemical Constitutions and Pharmacological activities of Acrostichum Aureum. International Journal of Innovations in Science, Engineering And Management. 2025 Nov 28.
15. Vaz DA, Fernandes S, Arondekar A. *Acrostichum aureum* linn (crosiers): Unveiling nutritional content, phytochemical composition and anxiolytic activity through preclinical studies. Journal of Research in Pharmacy. 2025 Jan 9;29(5):1959-71.
16. Nabeelah Bibi, S., Fawzi, M. M., Gokhan, Z., Rajesh, J., Nadeem, N., R.R., R. K., R.D.D.G., A., & Pandian, S. K. (2019). Ethnopharmacology, Phytochemistry, and Global Distribution of Mangroves—A Comprehensive Review. *Marine Drugs*, *17*(4), 231. https://doi.org/10.3390/md17040231
17. Raja S, Ravindranadh K. Preliminary phytochemical screening of different solvent extracts of whole plant of Acrostichum aureum. World Journal of Pharmaceutical Sciences. 2014 Dec 1:1753-9
18. Thomas T. In vitro evaluation of antibacterial activity of *Acrostichum aureum* Linn. Indian J. Nat. Prod. Resour. 2012 Mar;3(1):135-8.
19. Badhsheeba MA, Vadivel V. Physicochemical and phytochemical contents of the leaves of *Acrostichum aureum* L. Journal of Global Biosciences. 2020;9(4):7003-18..
20. Wu X, Huang Q, Xu N, Cai J, Luo D, Zhang Q, Su Z, Gao C, Liu Y. Antioxidative and anti-inflammatory effects of water extract of *Acrostichum aureum* Linn. Against ethanol-induced gastric ulcer in rats. Evidence-Based Complementary and Alternative Medicine. 2018;2018(1):3585394.
21. Linda TM, Maisyaroh DP, Berlyansah A, Tasliyah BJ, Juliantari E, Zul D, Fibriarti BL, Agesti ARA, Haryani Y. Efficacy of Endophytic Bacterium *Serratia marcescens* B.SB 1.1 associated with Sea Fern (*Acrostichum aureum* L.) as an Antidiabetic Agent. J Microbiol Biotechnol. 2025 Apr 27;35:e2412031. doi: 10.4014/jmb.2412.12031. PMID: 40295205; PMCID: PMC12089956.
22. Akinwumi KA, Abam EO, Oloyede ST, Adeduro MN, Adeogun YA, Uwagboe JE. Acrostichium aureum Linn: traditional use, phytochemistry and biological activity. Clinical Phytoscience. 2022 Nov 1;8(1):18.
23. Akinwumi KA, Eleyowo OO, Odesola KA, Adegboyega AM, Okon-ben VM, Onapelumi AT. Ethanol Leaf Extract of *Acrostichum aureum* Modifies Carbon Tetrachloride-induced Oxidative Stress and Hepato-renal Damage in Rats. Tropical Journal of Natural Product Research. 2024 Jun 1;8(6).
24. Akinwumi KA, Abam EO, Oloyede ST, Adeduro MN, Adeogun YA, Uwagboe JE. Acrostichium aureum Linn: traditional use, phytochemistry and biological activity. Clinical Phytoscience. 2022 Nov 1;8(1):18.
25. Roy AK, More P, Prasad S, Chouhan K, Ghatuary S. A Review on Phytochemical Constitutions and Pharmacological activities of Acrostichum Aureum. International Journal of Innovations in Science, Engineering And Management. 2025 Nov 28.
26. Kimura N, Kainuma M, Inoue T, Chan EW, Tangah J, Baba K, Oshiro N, Okamoto C. Botany, uses, chemistry and bioactivities of mangrove plants V: *Acrostichum aureum* and A. speciosum. ISME/GLOMIS Elect J. 2017;15(1):1-6.
27. Rahman S. Exploring the Anti-inflammatory Potential of Mangrove Flora: A Comprehensive Review.

28. SHWETHA U. *ASSESSMENT OF GENETIC DIVERSITY USING RANDOM AMPLIFIED POLYMORPHIC DNA (RAPD) MARKERS, PHYTOCHEMICAL SCREENING AND ANTIBACTERIAL STUDY OFACROSTICHUM AUREUM LINN* (Doctoral dissertation, St. Teresa's College (autonomous) Ernakulam).
29. Rawsan SK, Hossainº MH. Antinociceptive and CNS depressant effects of the. Journal of Dhaka International University.;1(1):191

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