

Abstracts

ISSN 0971-6548

Indian Hydrobiology, 24(2): 243–252, 2025

UGC-CARE List since 2019

Received: 31.10.2025; Accepted: 11.11.2025

Spirulina-Derived Bioactive Metabolites as Therapeutic Agents – A Review

C.K. Smitha¹, A.K. Anil Kumar¹, S. Shyam Kumar¹, D.G. Smitha², Rogimon P. Thomas³ and Asha Ramachandran^{1,*}

¹Post Graduate and Research Department of Botany, Government College for Women, Thiruvananthapuram 695 014, Kerala, India

²Post Graduate and Research Department of Botany, University College, 679 306, Kerala, India

³Department of Botany, CMS College (Autonomous), Kottayam, 686 001, Kerala, India

*Corresponding Author – asharam2007@gmail.com

Abstract

Spirulina platensis, a trichomatous cyanobacterium, is recognized for its high nutritional value and array of bioactive compounds, making it a functional food as well as a source of potential therapeutic agents. This review consolidates recent findings from extensive *in silico* studies that validate *Spirulina*'s multifaceted pharmacological activities, including anticancer, antihypertensive, antimicrobial, anti-inflammatory, antioxidant, antiviral, and neuroprotective effects. Emphasis is placed on relevant investigations employing molecular docking and computational simulations to elucidate interactions of *Spirulina*-derived metabolites—such as phycocyanin, carotenoids, and peptides—with key molecular targets implicated in disease pathways. Docking studies highlight significant binding affinities to proteins involved in inflammation (TNF- α , TGF- β), viral replication (SARS-CoV-2), angiogenesis (VEGFR2), and cellular senescence, offering mechanistic insight into their bioactivity. Complementary ADME/Tox analyses address pharmacokinetics and safety, supporting the potential translation of these compounds into nutraceutical and pharmaceutical applications.

Keywords: *In silico*; d-glucuronic acid; Quercetin-3-O-rhamnoside; C-phycocyanin; phycocyanobilin.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 253–262, 2025

UGC-CARE List since 2019

Received: 02.11.2025; Accepted: 10.12.2025

Diversity, Ecology, and Biotechnological Potential of *Cladophora* Kützinger in India: An Overview

Sumayya Abdul Rahim¹, Salvy Thomas², Asha Ramachandran³, C.K. Smitha³, A.S. Deepthi⁴ and Rogimon P. Thomas^{5,*}

¹Department of Botany, Mar Thoma College, Tiruvalla 689 103, Kerala, India

²Department of Botany, S.B. College (Autonomous), Changanacherry 686 101, Kerala, India

³Department of Botany, Government College for Women, Thiruvananthapuram 695 014, Kerala, India

⁴Department of Botany, Catholicate College, Pathanamthitta 689 645, Kerala, India

⁵Department of Botany, CMS College (Autonomous), Kottayam 686 001, Kerala, India

*Corresponding Author – rogimon@cmscollege.ac.in

Abstract

India, a biodiversity hotspot, harbours an extensive algal flora with over 9,000 documented taxa, among which the genus *Cladophora* (Chlorophyta: Ulvophyceae: Cladophorales) represents one of the most ecologically and biotechnologically significant groups. Comprising over 180 species globally, *Cladophora* is characterized by multinucleate, branched filaments with reticulate chloroplasts, forming dense mats in diverse aquatic environments. This review synthesizes current knowledge on the diversity, taxonomy, distribution, ecology, and applications of *Cladophora* in India. Indian *Cladophora* species, including *C. glomerata*, *C. crispata*, *C. vagabunda*, and *C. goensis*, are widely distributed across freshwater, estuarine, and marine habitats, contributing significantly to nutrient cycling, sediment stabilization, and benthic community dynamics. Historical cytological studies confirmed isomorphic alternation of generations, while recent molecular analyses reveal the genus to be polyphyletic, underscoring the need for genetic revision and integrative taxonomy. Ecologically, *Cladophora* acts

as a bioindicator of eutrophication and heavy metal pollution, supporting aquatic food webs and mangrove productivity. Biotechnologically, its high cellulose content, nutrient uptake capacity, and rich bioactive profile enable diverse applications in wastewater treatment, biofertilizer development, biodiesel production, bioplastic synthesis, and green nanotechnology. Extracts of *Cladophora* species exhibit potent antibacterial, antioxidant, and anticancer activities, affirming their pharmaceutical potential. Despite its ecological ubiquity and functional value, Indian research on *Cladophora* remains fragmented, largely morphology-based, and region-specific. This review synthesizes current knowledge on its diversity, distribution, and ecological roles across India, highlighting functions in nutrient cycling, bloom formation, and pollution monitoring, as well as its emerging biotechnological applications. It also identifies key research gaps and emphasizes the need for molecular tools to improve species delimitation and ecological assessment.

Keywords: *Cladophora*; Indian algae; ecology; bioindicators; biotechnology.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 263–268, 2025

UGC-CARE List since 2019

Received: 12.06.2025; Accepted: 22.08.2025

Bioaccumulation in Fish: Indian scenario

Arunachal Chatterjee*

Department of Zoology, Acharya Jagadish Chandra Bose College, 1/1B, Acharya Jagadish Chandra Bose Road, Kolkata 700 020, West Bengal, India

*Corresponding Author – arunc.ajcbc@gmail.com

Abstract

Bioaccumulation is the process by which organisms absorb and accumulate toxic substances like heavy metals from their environment over time, often at rates faster than they can eliminate them. Random usage of pesticides in agricultural farming along with chemical fertilizers both in agriculture and aquaculture, leads to continuous increasing heavy metal pollutions. Industrial effluents, agricultural runoff of heavy metals, domestic sewage and municipal waste and atmospheric deposition from vehicle emissions and industrial gases, contribute to water pollution. These cause accumulation in aquatic organisms. More importantly heavy metal deposition in fish leads to human hazards due to its consumption. Common heavy Metals found in fishes are mercury (Hg), lead (Pb), cadmium (Cd), arsenic (As), chromium (Cr) and nickel (Ni). These metals can enter fish through skin, gills, or by ingestion of contaminated food or sediments. Physiologically, bioaccumulation in fishes occurs through absorption of heavy metals from water, sediment, or prey. Metals bind to proteins or accumulate in tissues (e.g., liver, kidney and muscle). Highest consumers of the food chain accumulate more such heavy metals, which leads to biomagnification. When humans consume contaminated fish, these metals can accumulate in their body over time, causing a range of health effects such as neurological and developmental damage, risk to fetuses and children, impaired cognitive function by damaging kidney function, brain development and bone demineralization. Heavy metals, accumulated and transferred to human are the potential carcinogens. Heavy metal pollution in fish has become an important worldwide concern, not only because of the threat to fish, but also due to the health risks associated with fish consumption. This review summarized the bioaccumulation of heavy metals in Indian aquaculture systems and its effect in human health.

Keywords: Heavy metals; pesticides; biomagnification; bioaccumulation; aquaculture; contamination; pollution.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 269–280, 2025

UGC-CARE List since 2019

Received: 30.05.2025; Accepted: 02.08.2025

Seasonal Variation in Physicochemical Characteristics of an Idol Immersion Pond of Patna – Bihar

Dipty Kumari* and D.K. Paul

Department of Zoology, Patna University, Patna, Bihar 800 005, India

ORCID ID: 0009-0001-1795-4738

*Corresponding Author – imdipty.dk@gmail.com

Abstract

In the present study, seasonal variation in the water quality of Prachin Shiv Mandir Pond (Phulwari Sharif) of Patna was assessed. Water temperature, pH, TS, TSS, TDS, turbidity, chloride, TA, DO, TH, calcium, BOD, phosphate and nitrate were investigated during the winter, summer and monsoon season of 2022 following APHA (2017). The results showed seasonal variation in pond water with highest mean values during the summer and the lowest in winter mostly, with temperature playing a crucial role in seasonal variation, while the act of idol immersion has degraded the water quality. As per BIS (2012) and CPCB (1995), pond water was also found

unsuitable for drinking and bathing purpose. A positive correlation between temperature and most of the water variables, while a negative correlation between temperature and DO was observed. Thus, even after moderate management of the pond, the water of the temple pond was found to be degraded due to the idol immersion, puja materials and domestic waste water discharge.

Keywords: Idol immersion; Temple Pond; Physicochemical properties; Seasonal variation; Water quality.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 281–288, 2025

UGC-CARE List since 2019

Received: 03.07.2025; Accepted: 31.10.2025

Studies on Diversity of Benthic Macroinvertebrates in River Wardha near Ballarpur, District Chandrapur (M.S.) India

Pragati S. Turale^{1,*}, Naresh R. Dahegaonkar² and Imran Mithani³

¹IHLRSS, Dr. Ambedkar College of Arts, Commerce and Science, Chandrapur, Maharashtra, India

²PG. Department of Zoology, Dr. Khatri Mahavidyalaya Tukum, Chandrapur, Maharashtra, India

³PG. Department of Zoology, Dr. Ambedkar College of Arts, commerce and Science, Chandrapur, Maharashtra, India

*Corresponding Author – pragatiturale170@gmail.com

Abstract

River Wardha, the perennial river which is a tributary of Pranhita river flowing through Madhya Pradesh and Maharashtra and is the important aquatic ecosystem which sustains both natural and anthropogenic pressure particularly from agricultural and industrial activities. A year round investigation was carried out at two sampling stations of river Wardha from October 2023 to December 2024. During the study total 36 species of benthic macroinvertebrates from three Phylum were identified, which includes 17 species of phylum Mollusca, 12 species of phylum Arthropoda and 7 species of phylum Annelida. High density of molluscs at both sampling stations indicates healthy and diverse environment of the lotic ecosystem under study.

Keywords: Macroinvertebrates; Mollusca; Gastropoda; Insecta; Wardha river; Ballarpur.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 289–296, 2025

UGC-CARE List since 2019

Received: 24.07.2025; Accepted: 03.09.2025

Harvesting fresh water microalgae *Chlorella vulgaris* using chemical and electroflocculation

Anjana Satheesan¹, Ananthu Santhosh¹, E.M. Fousiya¹, C.S. Amrutha¹ and S. Shyam Kumar^{2,*}

¹Department of Botany, Maharaja's College, Ernakulam 621 011, Kerala, India

²Centre of Advanced Studies in Algology (CASA), Department of Botany, Government College for Women, Thiruvananthapuram 695 014, Kerala, India

*Corresponding Author – gokulamshyam01@gmail.com

Abstract

Efficient harvesting of microalgal biomass at large scale requires the implementation of suitable separation techniques that maintain cell viability and functional activity. Although various harvesting methods are currently available, many are limited by high operational costs and environmental concerns. Flocculation represents a promising, scalable approach for microalgae harvesting due to its operational simplicity and potential for cost-effectiveness. In the present study, three different flocculation methods were evaluated for the recovery of *Chlorella vulgaris* from the culture medium. Among the six chemical flocculants tested, ZnCl₂ and ZnSO₄ demonstrated high flocculation efficiencies of 89.39 and 90.90%, respectively. Electroflocculation using a copper electrode yielded the highest efficiency, achieving 99.89% removal of algal cells. In addition, alkaline-induced flocculation was assessed, and pH 12 was identified as the most effective condition for biomass separation. These findings indicate that electroflocculation using copper electrodes offers a highly efficient method for microalgae harvesting and could be considered for industrial-scale applications. Furthermore, the use of metal salts and alkaline pH provides alternative strategies, which, depending on the process requirements and cost constraints, may be tailored for sustainable biomass recovery in biofuel and bioproduct production systems.

Keywords: *C. vulgaris*; Chemical flocculation; Microalgae separation; Electroflocculation; Flocculation efficiency; Flocculants.

Effect of dry preservation on proximate composition and mineral content of Two Selective Fish Species, *Puntius sophore* (Hamilton, 1822) and *Chanda nama* (Hamilton, 1822) and their Enriched Nutritive Contribution to Human Health

Priyanki Sharma^{1,*}, Suman Sahu¹, Puja Singh¹, Najma Khatun², Manash Pratim Borah¹, Tabu Kaishyap Borthakur¹, Shatabdi Biswas³, Parthana Borah¹ and Prerona Borah¹

¹Department of Zoology, Nagaon University, Nagaon 782 001, Assam, India

²Department of Zoology, Cotton University, Panbazar, Guwahati 781 001, Assam, India

³Department of Zoology, B.P Chaliha College, Nagarbera, Kamrup 781 127, Assam, India

*Corresponding Author – priyanki656962@gmail.com

Abstract

Dried fish is a specially processed fishery product along with high nutritional value and health benefits due to important nutritional components. Dry fish supply and nutrient value is vital for supporting the health and increasing wellbeing of the human. The study aimed on the evaluation of proximate composition of macronutrients and mineral content of two species of *Puntius sophore* and *Chanda nama* in both their dried and fresh conditions. In the results, the highest moisture content was found in fresh *Puntius sophore* (72.53%) and lowest in the dried *Chanda nama* (10.45%). The highest protein content was found in dried *Chanda nama* (48.43%) followed by dried *Puntius sophore* (43.78%) but in fresh fish of both the species lower content of protein was recorded. Lipid content varied from 5.87% (fresh *Chanda nama*) to 15.65% (dried *Puntius sophore*). The ash content was ranged from highest in the dried *Puntius sophore* (19.71%) to the lowest in the fresh *Puntius sophore* (3.09%). Carbohydrate content was found higher in both dry preserved fishes in comparison to their fresh forms. The calcium content ranged between 4376.45–5764.89 mg/100 g with the highest in the dried *Puntius sophore* (5764.89 mg/100 g) followed by *Chanda nama*. Whereas phosphorus and iron contents were recorded highest in the dried *Chanda nama* followed by dried *Puntius sophore*. The mineral content was found very low in both fishes in their fresh condition. The study shows that the dried fishes of both the species are having all macronutrients and minerals in higher amount than their fresh therefore it can be a considered as an excellent source of essential nutrients that are favorable for human health. By comparing both the species in fresh and dried condition, we found that dried *Puntius sophore* and dried *Chanda nama* has high protein, lipid, Ash, Calcium, carbohydrate, phosphorus, calcium, iron content than the fresh ones which indicates that dry fish can be good source of nutritional food in low income countries like India. Higher values of nutrients in dry preserved fishes may be due to the moisture loss and which may be the reason that macronutrients and minerals get concentrated. Drying is a common method of fish processing and preservation and it also inhibits the microbial growth. Because of the removal of moisture content from the fishes the enzymatic and chemical reactions are also reduced due to which microbial growth is not possible and thus it prevents spoilage. In countries or places where dietary diversity is limited, this technique can contribute as an important factor in preserving the nutritional values. Therefore this paper can be helpful in providing the baseline data for future research.

Keywords: Dried fish; Fresh fish; Minerals; Nutrition; Preservation; Proximate composition.

Diversity and Distribution of Seaweeds along the Thiruvananthapuram Coast, South-West India

J.S. Abhinlal, S. Shyam Kumar*, A. Manoj Kumar, G.P. Gayatri, Bosco Lawrence and M.S. Sheeba

Centre of Advanced Studies in Algology, PG and Research Department of Botany, Government College for Women, Thiruvananthapuram 695 014, Kerala, India

*Corresponding Author – gokulamshyam01@gmail.com

Abstract

The study aims to investigate the diversity and distribution of seaweeds of the coastal areas in the Thiruvananthapuram district of Kerala state, India. The survey and collection of the seaweeds along the coast of

Varkala (8°44'08" N 76°42'13" E), Pozhiyoor (8°17'49" N 77°05'29" E), Perumathura (8°38'02" N 76°47'07" E) and Kovalam (8°23'09" N 76°58'33" E) were conducted from April 2023 to December 2024. The algal identification was done with the aid of standard flora and monographs. During the present study, 4 field trips were conducted, and 378 individual samples were collected. From these samples, a total of 76 seaweed species were identified. The identified algal species belong to the Chlorophyceae, the Rhodophyceae and the Phaeophyceae. Diversity of seaweeds along coastlines is significantly influenced by varying salinity levels. For example, in coastal regions such as Varkala, Pozhiyoor, and Perumathura, where salinity levels slightly decrease during the monsoon season, a marked increase in the abundance and diversity of the members of the Chlorophyceae was observed. In contrast, the higher salinity conditions prevalent during the pre-monsoon and post-monsoon periods support a distinct assemblage of more salt-tolerant species, particularly of the Rhodophyceae and the Phaeophyceae. These salinity fluctuations across the coastal areas therefore play a pivotal role in shaping the distribution, abundance, and diversity of the local seaweed communities.

Keywords: Diversity of Seaweeds; macroalgae; Thiruvananthapuram; South west India; Kovalam.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 313–314, 2025

UGC-CARE List since 2019

Received: 20.09.2025; Accepted: 11.12.2025

A Note on Coenobial Alga: *Hydrodictyon Reticulatum*

Deepak Kumar Jha* and Surya Kant Singh

University Department of Botany, L. N. Mithila University, Darbhanga 846 004, Bihar, India

*Corresponding Author – deepakkumarjha781@gmail.com

Abstract

During a survey of algal flora in the freshwater ecosystems of Supaul District, North Bihar, the presence of *Hydrodictyon reticulatum* (Linnaeus) Bory was documented for the first time in Bihar. This study thoroughly examines the morphotaxonomy and distribution patterns of *H. reticulatum* (Linnaeus) Bory in the area, providing detailed insights into its characteristics and regional prevalence.

Keywords: Chlorococcales; Algae distribution; *Hydrodictyon*; New record; North Bihar.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 315–318, 2025

UGC-CARE List since 2019

Received: 30.09.2025; Accepted: 07.12.2025

On the Occurrence and Distribution of *Spirogyra tolosana* Comere in Madhubani District, North Bihar, India

Sarvjeet Kumar* and Khwaja Salahuddin

University Department of Botany, L. N. Mithila University, Darbhanga, Bihar 846 004, India

*Corresponding Author – kumarsarvjeet0406@gmail.com

Abstract

During a survey of algal flora in the freshwater ecosystems of Madhubani District, North Bihar, the presence of *Spirogyra tolosana* Comere was documented as the second record from India and the first from Madhubani District. The present study provides a comprehensive account of the morphotaxonomy and distribution patterns of *S. tolosana* Comere, offering valuable insights into its distinguishing features and regional occurrence.

Keywords: Freshwater; Algae; *Spirogyra*; Chlorophyceae; Zygnematales.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 319–328, 2025

UGC-CARE List since 2019

Received: 23.10.2025; Accepted: 09.12.2025

A Study on Physico-chemical Parameters of Manchanabele Reservoir, Ramanagara District, Karnataka

V. Ravi¹* and S. Ramakrishna²

¹Research Scholar, Department of Zoology, Bangalore University, Karnataka, India

²Department of Zoology, Bangalore University, Karnataka, India

*Corresponding Author: ravivkset@gmail.com

Abstract

The present paper deals with the study of Physico-chemical parameters of Manchanabele Reservoir from February 2023 to January 2024 which includes Pre-monsoon (Feb to May), Monsoon (June to Sep), Post-monsoon (Oct. to

Jan). Water quality parameters were recorded such as Atmospheric Temperature (29.7–31.7°C), pH (8.4–9.8), Electrical conductivity (918–1216 $\mu\text{mhos/cm}$), Total dissolved solids (638–890 mg/L), Total Hardness (112–220 mg/L), Total Alkalinity (240–450 mg/L), Dissolved Oxygen (3.0–5.7 mg/L), Biological oxygen demand (4.7–12.5 mg/L), Bicarbonates (291–140 mg/L), Chlorine (140–220 mg/L), Calcium (18–48 mg/L), Magnesium (11–21 mg/L), Sulphate (28–94 mg/L), Sodium (175–360 mg/L). The results by the study of physico-chemical parameters are compared with Indian standard values (BIS, 2012) and WHO (1997) standards. In the present study pH is found to be slightly above the limit. Correlation analysis was done using PAST (2001) software.

Keywords: Water; Physicochemical parameters; Manchanabele reservoir; Correlation co-efficient; Indian standard values; Seasons; Tributary.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 329–338, 2025

UGC-CARE List since 2019

Received: 23.10.2025; Accepted: 22.11.2025

Zooplankton diversity in Manchanabele Reservoir, Karnataka, India

V. Ravi^{1*} and S. Ramakrishna²

¹Research Scholar, Department of Zoology, Bangalore University, Bangalore, Karnataka, India

²Department of Zoology, Bangalore University, Bangalore, Karnataka, India

*Corresponding Author – ravivkset@gmail.com

Abstract

The present study aims to assess zooplankton composition and diversity and physicochemical parameters of Manchanabele reservoir, Ramanagara, India, from June 2022 to May 2023. In all a total of 42 zooplankton species were recorded in which 26 rotifers 10 Cladocerans 04 Copepods and 02 Ostracod species were found. The biodiversity index like Dominance was greater in Monsoon season, the Shannon diversity index ranged between $H' = 1.28$ and 1.31. The physico-chemical parameters of the reservoir show moderate levels of nutrients with not much variation. The Zooplankton density shows significant positive correlation with Electrical conductivity, Atmospheric Temperature, Total hardness and pH. The principal component analysis indicates influence of major nutrients on zooplankton community in the reservoir. The study reveals that the presence of some zooplankton species like Keratalla, Brachionus, Cypris, Chydorus and Cyclops can be considered as biological indicator.

Keywords: Zooplankton; Diversity; Littoral; Correlation coefficient; Manchanabele reservoir; biodiversity index; physicochemical parameters; Biological indicator; Principal component analysis.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 339–346, 2025

UGC-CARE List since 2019

Received: 28.10.2025; Accepted: 24.11.2025

Comparative Feeding Ecomorphology and Habitat Association of *Puntius amphibius* and *Puntius viridis* from the Kallada River, Kerala

S. Sheela^{1*} and V. Reshmi²

¹TK Madhava Memorial College Nangiarkulangara, Alappuzha, University of Kerala, Kerala, India

²Department of Zoology, SN College, Cherthala, University of Kerala, Kerala, India

*Corresponding Author – drsheelas@tkmmc.ac.in

Abstract

Rivers are dynamic ecosystems characterised by continuous gradients in hydrological and structural conditions that shape the functional morphology and ecology of aquatic organisms. The present study examined the feeding-related ecomorphological divergence between *Puntius amphibius* and *Puntius viridis*, two cyprinids coexisting in the mid-stretch region of the Kallada River, Kerala. Eleven morphometric indices associated with feeding and foraging were quantified and compared using Mann–Whitney U tests, Principal Component Analysis and Discriminant Analysis. Interspecific differences were detected in the compression index (CI), position of eye (PE), relative height of head (RHH), relative height of mouth (RHM), and relative area of eye (RAE) ($p < 0.05$). *Puntius viridis* had greater body compression, larger eyes, and a longer digestive tract, indicative of omnivorous, mid-water feeding. In contrast, *P. amphibius* had deeper heads and larger mouth openings adapted for benthic foraging. Field observations further indicated that *P. viridis* preferred moderately flowing, vegetated habitats, microhabitats, whereas *P. amphibius*, in addition to these, also preferred deeper, faster-flowing regions. The study highlights how morphological variations and habitat preference facilitate coexistence among sympatric species within a hydrologically heterogeneous river system.

Keywords: Ecomorphology; Feeding adaptation; Microhabitats; Functional morphology; Resource partitioning.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 347–354, 2025

UGC-CARE List since 2019

Received: 31.10.2025; Accepted: 06.12.2025

***In Silico* Dual Target Docking and ADME Analysis of Compounds present in *Dictyota dichotoma* (Hudson) J.V. Lamouroux against Migraine and Breast Cancer**

Sreeja Krishnan* and Anakha S. Deth

Post Graduate, Department of Botany, Sree Narayana College, Cherthala, Alappuzha 688 582, Kerala, India

*Corresponding Author – sreevaskrishna@gmail.com

Abstract

The present study investigates the therapeutic potential of selected bioactive compounds derived from the marine brown alga *Dictyota dichotoma* (Hudson) J.V. Lamouroux through a computational approach involving dual-target molecular docking and ADME analysis. The compounds were selected based on their reported bioactivities, and molecular docking was performed against two clinically significant protein targets - Calcitonin Gene-Related Peptide (CGRP) receptor, associated with migraine pathogenesis (PDB ID: 3N7S), and the Epidermal Growth Factor Receptor (EGFR), implicated in breast cancer progression (PDB ID: 3POZ).

Notably, Isopachydictyol and Apigenin-7-O-glucoside showed strong binding affinities against CGRP (−9.2 kcal/mol), while Dictyotatriol A exhibited high affinity for EGFR (−9.0 kcal/mol), indicating significant potential for therapeutic applications. The interaction analysis revealed key hydrogen bonding and hydrophobic interactions within the binding pockets, supporting the compounds' specificity and binding stability. Additionally, SwissADME analysis confirmed favorable pharmacokinetic profiles, including good gastrointestinal absorption and drug likeness. These findings highlight the promise of *Dictyota dichotoma* derived compounds as lead molecules in developing novel treatments for migraine and breast cancer.

Keywords: *Dictyota dichotoma*; Molecular Docking; CGRP Receptor; EGFR Receptor; SwissADME; Migraine; Breast Cancer.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 355–370, 2025

UGC-CARE List since 2019

Received: 31.10.2025; Accepted: 22.11.2025

Comprehensive Evaluation of Indigenous Freshwater Algae for Lipid Accumulation, Biomass Productivity and Phycoremediation of Aquaculture Wastewater

P. Kiruthika Lakshmi^{1,*} and S. Aravind²

¹Department of Biotechnology, The American College, Madurai 625 002, Tamil Nadu, India

²Department of Microbiology, PKN Arts and Science College, Madurai 625 706, Tamil Nadu, India

*Corresponding Author – kiruthikaparameswaran@gmail.com

Abstract

Algal biomass offers a cost-effective and eco-friendly alternative for generating biodiesel and nutrient removal. Indigenous algal species were isolated from the water bodies of Kodikulam, Madurai and examined for their growth capacity and lipid productivity. Among these, *Pithophora* sp. exhibited higher rate of growth and recorded the high lipid accumulation (33%) on the 30th day of growth. TLC analysis confirmed the presence of mono-, di-, and tri-galactosyl diglycerides, while GC analysis of *Pithophora* sp. revealed the existence of major fatty acids such as myristic (C14:0), palmitoleic (C16:1), and heptadecanoic (C17:0) acids. The fatty acid methyl ester profile showed a predominance of monounsaturated fatty acids (53.4%) favourable for biodiesel synthesis. Outdoor cultivation of *Pithophora* sp. using untreated aquaculture wastewater promoted rapid growth and nutrient assimilation, demonstrating the adaptability and phycoremediation potential of the selected algal strain. FTIR spectroscopy validated the presence of characteristic functional groups of essential macromolecules in the algae.

The high lipid productivity, desirable fatty acid profile and adaptability of *Pithophora* sp. suggest that it can serve as a suitable candidate for simultaneous production of biodiesel and nutrient recovery from aquaculture wastewater.

Keywords: Indigenous algae; *Pithophora*; Fatty acid methyl esters; Aquaculture wastewater; biofuel production.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 371–376, 2025

UGC-CARE List since 2019

Received: 31.10.2025; Accepted: 26.11.2025

Ecomorphological Trait Divergence and Niche Partitioning Among Three Sympatric Fish Species in a Tropical Lake

J. Leji^{1,*}, Binushma Raju², G.S. Babitha² and S. Preethi¹

¹Department of Zoology, S N College, Chempazhanthy, University of Kerala, Kerala, India

²Department of Zoology, S N College, Varkala, University of Kerala, Kerala, India

*Corresponding Author – lejimanoj@gmail.com

Abstract

Morphological differentiation among sympatric fish species can facilitate ecological coexistence through variation in swimming and feeding performance. This study examined three freshwater species, *Nematolosa nasus*, *Eetroplus suratensis*, and *Oreochromis mossambicus* (n=15 each), using ecomorphological indices. Principal Component Analysis (PCA) explained 85.63% of total variation and revealed distinct clustering with minimal overlap, primarily driven by caudal peduncle dimensions and head morphology. PERMANOVA confirmed significant multivariate differences among species (F=22.68, p=0.0001). Pairwise comparisons indicated that *N. nasus* possessed more developed caudal peduncles, *O. mossambicus* exhibited greater head depth, and *E. suratensis* showed intermediate values. These results demonstrate clear ecomorphological divergence among sympatric species, reflecting differences in locomotor and trophic strategies.

Keywords: Sympatric species; Ecomorphology; Functional traits; Caudal peduncle morphology; Interspecific competition.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 377–388, 2025

UGC-CARE List since 2019

Received: 31.10.2025; Accepted: 06.12.2025

Application of algal extract to promote growth and development in *Capsicum annum* L.

Sheetal V. Londhe¹, Nilesh V. Malpure^{1,*}, Babasaheb D. Varpe¹ and Pankaj S. Dawange²

¹Department of Botany, SSGM College, Kopergaon 423 601, India

²Department of Food Science and Nutrition, School of Sciences, Sanjivani University, Kopergaon 423 602, India

*Corresponding Author – nmalpure@gmail.com

Abstract

The present study involves the application and the role of algal extracts and combination of algae with plant (*Moringa oleifera*) extracts to improve growth and yield in *Capsicum annum* L. (chilly). Algal samples were collected from two selected farm lakes from Ahmednagar district. Extracts were prepared in three concentrations of 10, 15 and 25% respectively. The prepared extracts were applied to study the effect on seed germination, shoot and root growth, plant height, number of leaves, flowering, and fruit yield. The treated plants showed incremental results in the parameters studied over the control plants. Treatment 1 at 10% showed increased seed germination and shoot and root growth, whereas treatment 1 at 15% showed increased height and larger leaf area, while the tallest plants and more number of leaves were seen in Treatment 1 at 15%. Early flowering was observed in Treatment 4 at 15%, and the highest number of flowers and fruit yield were recorded in the 25% treatments. Overall, the study showed that algal extracts are rich in nutrients and growth-promoting substances that help plants grow faster, produce more flowers, and give better yields. Hence use of algal extracts for foliar spray can act as a simple, eco-friendly and low-cost alternative to chemical fertilizers for sustainable chilly farming.

Keywords: Algal extract; *Capsicum annum* L.; Foliar application; Seed germination; Flower initiation; Fruit yield; Biofertilizer.

First Report of Charophytes from the Lower Miocene Sediments of Western Kachchh, Gujarat, India

S.N. Kamble¹, M.A. Sonar¹, A.N. Salve² and K.M. Wanjarwadkar^{1,*}

¹Department of Geology, Government Institute of Science, Chhatrapati Sambhajnagar 431 004, India

²Department of Botany, Government Institute of Science, Chhatrapati Sambhajnagar 431 004, India

*Corresponding Author – kmwisa2012@gmail.com

Abstract

The western Kachchh basin of India is known as pericratonic rift basin that was filled with clastic and non clastic sediments. These sediments and the fossils content represent Jurassic to present day. The present paper deals with studies on the occurrence of Charophytes-Gyragonites from limestone and shale belonging to Mithinadi section of Lower Miocene Chhasra Formation. The member of charophytes is well represented in fresh water and brackish environment. The morphological features of specimens resemble with the *Chara globularis globularis* Thuiller. The fructifications i.e., Gyragonites are calcified and have range of sizes. The Charophyte assemblage described here is the first record from Lower Miocene of western Kachchh. The other associated fossils recorded from the same samples are foraminifers i.e. *Rotalidium*, *Elphidium*, *Quinqueloculina* and some Ostracods. The reported Charophytes of Rampar, Kachchh suggest that these were transported from interspersed lacustrine to marine environment.

Keywords: Charophytes; Mithinadi; Miocene; Kachchh; Palaeoenvironment.

ISSN 0971-6548

Indian Hydrobiology, 24(2): 397–406, 2025

UGC-CARE List since 2019

Received: 13.11.2025; Accepted: 29.11.2025

Seasonal Variations in Physicochemical Characteristics of the River Erai, Chandrapur District, Maharashtra, India

Pragati S. Turale^{1,*} and Naresh R. Dahegaonkar²

¹IHLR & SS, Dr. Ambedkar College of Arts, Commerce and Science, Chandrapur, Maharashtra, India

²PG Department of Zoology, Dr. Khatri Mahavidyalaya, Tukum, Chandrapur, Maharashtra, India

*Corresponding Author – pragatiturale170@gmail.com

Abstract

This research examines seasonal variations in the physicochemical properties of the Erai River, a significant tributary of the Wardha River located in Chandrapur district, Maharashtra, India. The river serves as a vital freshwater source for domestic consumption, agriculture and industrial operations, but is increasingly influenced by anthropogenic activities such as municipal discharges, coal mining effluents, and agricultural runoff. Water samples were collected from upstream and downstream stations during three hydrological periods, that is, summer, monsoon, and winter. Key parameters examined include Water temperature, pH, Electrical Conductivity, Total Dissolved Solids (TDS), Turbidity, Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Hardness, Chlorides, Sulphate, Nitrate, Phosphate and Total Alkalinity, using standardised APHA methodologies. The results indicated pronounced seasonal patterns, with elevated turbidity, nutrient load and increased BOD during the monsoon, accompanied by a reduction in DO levels, signifying organic enrichment and surface runoff pollution. Winter conditions demonstrated partial recovery in water clarity and nutrient levels. Spatially, the downstream segment exhibited greater contamination relative to the upstream location, reflecting cumulative anthropogenic inputs. These findings underscore the importance of continuous monitoring and effective management interventions to maintain the ecological health of the Erai River. It clearly demonstrates that water quality is controlled by dual forces of pronounced seasonal variability and localised anthropogenic pressures.

Keywords: Erai River; Physicochemical analysis; water quality; Chandrapur; Pollution; Ecosystem.

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Pragati S. Turale^{1,*} and Naresh R. Dahegaonkar²

¹IHLR & SS, Dr. Ambedkar College of Arts, Commerce and Science, Chandrapur, Maharashtra, India

²PG Department of Zoology, Dr. Khatri Mahavidyalaya, Tukum, Chandrapur, Maharashtra, India

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Abstract

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Keywords: Erai River; Physicochemical analysis; water quality; Chandrapur; Pollution; Ecosystem.

GC-MS analysis of chloroform extract of *Sargassum tenerrimum* J.Ag. (Brown Algae) collected from Manapad, Thoothukudi district, Tamil Nadu, India

J. John Peter Paul* and B. Abisha

Department of Botany, St. Xavier's College (Autonomous), (Affiliated to Manonmaniam Sundaranar University, Abishekapatti, Tirunelveli 627 012, Tamil Nadu, India), Palayamkottai 627 002, Tamil Nadu, India

*Corresponding Author – johnarock2008@yahoo.com

Abstract

The present study was carried out to explore the various bioactive compounds present in the chloroform extract of *Sargassum tenerrimum* J.Ag. collected from Manapad, Tirunelveli district, Tamil Nadu, India, using Gas Chromatography-Mass Spectrometry (GC-MS). The study revealed 20 major peaks in GC-MS spectrum of chloroform extract which indicated the presence of 20 different compounds. The remarkable compounds with their retention time in the chloroform extract were Dodecane,2,6,11-trimethyl-(13.09), Hexadecane (13.82), Octadecane, 5-methyl-(16.23), Eicosane (16.83), Pentadecane (17.69), Carbonic acid, decyl tetradecyl ester (18.92), Tetracosane (19.43), Tetradecanoic acid (19.96), Neophytadiene (20.50), 2-Methylteracosane (20.96), 5,5-Diethylpentadecane (21.30), 7,9-Di-tert-butyl-1-oxaspiro (4,5) deca,-6,9-diene-2,8-dione (21.45), Dotriacontane (21.75), Tricontane (21.80), 1,4-Benzene dicarboxylic acid, bis(2-methylpropyl)ester (21.91), n-Hexadecanoic acid (22.15), Hexacontane (23.45), Octadecane 2,6,10,14-tetramethyl (23.85), Heptadecane, 3-methyl-(25.40) and Tetrapentacontane (25.77). From the present study, the novel bioactive information can be predicted to support further studies to evaluate the structure of bioactive compounds with their pharmacological activities.

Keywords: Brown algae; GC-MS; *Sargassum tenerrimum*; Chloroform extract; Manapad.

Studies of Gastropod Fauna of River Wunna near Hinganghat, District Wardha, Maharashtra, India

Prashant B. Pusdekar^{1,*}, Naresh R. Dahegaonkar² and Imran R. Mithani³

¹IHLRSS, Department of Zoology, Dr. Ambedkar College of Arts, Commerce and Science, Chandrapur, Maharashtra, India

²Dr. Khatri Mahavidyalaya, Tukum, Chandrapur, Maharashtra, India

³Dr. Ambedkar College of Arts, Commerce and Science, Chandrapur, Maharashtra, India

*Corresponding Author – prashantpusdekar@gmail.com

Abstract

Wunna river is a major river in Wardha district in eastern Maharashtra. The present investigation reports the results of an intensive study on the diversity of gastropod fauna in river Wunna near Hinganghat of Wardha district, Maharashtra, India. The present work was carried out from January 2024 to December 2024. During the period of investigation total 13 species belonging to 5 families were recorded in which higher density of *Indoplanorbis* species while minimum density of *Pila globosa* was recorded.

Keywords: Gastropods; River Wunna; Hinganghat; Wardha; Maharashtra.

Development and Characterization of Chitosan-Based Nanoparticles for Antioxidant and Anticoagulant Applications

R. Saravanan^{1,*}, M. Sumithra², S. Meenakshi^{3,4} and K. Bhanumathi⁵

¹Department of Zoology, Sri Kumara Gurupara Swamigal Arts College, Srivaikuntam 628 619, (Affiliated to Manonmaniam sundaranar University, Tirunelveli), Tamil Nadu, India

²Ph.D Research Scholar, Reg number-23112102192020, Department of Zoology, Kamaraj College, Thoothukudi 628 003, (Affiliated to Manonmaniam sundaranar University, Tirunelveli), Tamil Nadu, India

³PG & Research Department of Microbiology, Sadakathullah Appa College, Tirunelveli 627 011, (Affiliated to Manonmaniam sundaranar University, Tirunelveli), Tamil Nadu, India

⁴Center for Global Health Research, Saveetha Institute of Medical Sciences, Chennai 602 105, Tamil Nadu, India

⁵PG & Research Department of Zoology, Kamaraj College, Thoothukudi 628 003, (Affiliated to Manonmaniam sundaranar University, Tirunelveli), Tamil Nadu, India

*Corresponding Author – saravanankgs79@gmail.com

Abstract

Chitosan, a linear polysaccharide derived from the chitin shells of crustaceans through treatment with alkaline substances like sodium hydroxide, exhibits diverse commercial and potential biomedical applications along with notable pharmacological properties. This study aims to explore the bioactive potential of chitosan nanoparticles, synthesized via acetic acid treatment and subsequent drying post-centrifugation of TPP solution. FTIR spectroscopy revealed characteristic peaks confirming the presence of chitosan and other functional groups. SEM confirms chitosan nanoparticles maintain shape and size consistency within 50 μm , with chitosan prominently visible, indicating potential interactions with surroundings. XRD reveals peaks at 23.153° and 38.285° , indicating distinct crystalline structures in the studied material. The recorded zeta potential value of 2.2 mV indicates the surface charge of the material under study. The investigation confirmed the natural antioxidant properties of chitosan nanoparticles, exhibiting significant radical scavenging effects equivalent to 3.8 mg/g of ascorbic acid at 1 mg/ml concentration, along with notable DPPH (91%/1 mg) and Deoxyribose (71%/1 mg) radical scavenging activity. Furthermore, the anticoagulant potential of chitosan nanoparticles was demonstrated, particularly at lower concentrations (50 $\mu\text{g/ml}$). This study highlights the multifaceted bioactive attributes of chitosan nanoparticles, indicating their potential role in diverse biomedical applications.

Keywords: Anticoagulant; Antioxidant; Chitin; Chitosan; Chitosan nanoparticle; Zeta potential.

Harnessing the Antimicrobial Potential of *Sargassum tenerrimum* from the Western Coast of Maharashtra, India

Mukul Machhindra Barwant^{1,*} and Vaneeta C. Karande²

¹Department of Botany, Sanjivani Rural Education Society's,
Sanjivani Arts Commerce and Science College,
Kopergaon, Ahilyanagar 423 603, Maharashtra, India

²Rayat Shikshan Sansthas, Yashwantrao Chavan Institute of Science, Satara 415 001,
Maharashtra, India

*Corresponding Author – mukulbarwant97@gmail.com

Abstract

Seaweeds of the genus *Sargassum* are well known for their bioactive metabolites with pharmaceutical and industrial importance. The western coast of Maharashtra, India, harbors diverse *Sargassum* species that remain underexplored for their antimicrobial potential. In the present study, solvent extracts of *Sargassum tenerrimum* were evaluated for antibacterial and antifungal activity using the disc diffusion method. Test organisms included bacterial strains (*Pseudomonas aeruginosa*, *Bacillus subtilis*, *Serratia marcescens*, *Staphylococcus aureus*, *Escherichia coli*, and *Enterococcus faecalis*) and fungal pathogens (*Candida albicans* and *Aspergillus niger*). Ethanolic and acetone extracts exhibited moderate antibacterial effects, with *B. subtilis* and *P. aeruginosa* being the most susceptible. Antifungal activity was more pronounced, showing inhibition zones up to 8 mm against *C. albicans* and *A. niger*. Minimum inhibitory concentration (MIC) assays confirmed a dose-dependent reduction in microbial growth, with significant inhibition at concentrations of 500–1000 µg/disk. These findings highlight the antimicrobial potential of *Sargassum* spp. from the Maharashtra coast and suggest their role as a promising source of natural therapeutic agents for combating bacterial and fungal infections.

Keywords: *Sargassum* spp.; antimicrobial potential; antibacterial; antifungal activity; minimum inhibitory concentration (MIC).

Dynamics of Root Exudation in the Endorhizosphere of Selected Jowar Accessions across Growth Stages and their Influence on Microbial Activity

B. Uma Maheswari* and K. Chitra

PG and Research Department of Microbiology, Sadakathullah Appa College, Tirunelveli 627 011,
Tamil Nadu, India

*Corresponding Author – hariniuma21@gmail.com

Abstract

Root exudates influence microbial communities, nutrient cycling, and soil health. This study examined root exudation in the endorhizosphere of six Jowar accessions (Pant Chari 6, Talki, Co-30, E-182, E-JN-4, E-158) across active tillering, flowering, and physiological maturity, under three levels of nitrogen. Exudates were collected using a short-term CaCl₂-immersion and analyzed for sugars, amino acids, proteins, organic acids, and phenolics. Microbial responses were assessed via MBC, DHA, phosphatase, and soil respiration. Sugars dominated early stages, while amino acids and phenolics increased at later stages. E-182 at maturity showed the highest amino acids and phenolics, enhancing microbial growth and functional diversity. RSM optimization indicated that moderate exudate concentration (0.21 mg C g⁻¹ soil), 7-day incubation, and moderate nitrogen (50 mg N kg⁻¹ soil) maximized microbial activity (MBC: 558.37 µg C g⁻¹ soil; DHA: 178.35 µg TPF g⁻¹ soil h⁻¹; phosphatase: 747.08 µg pNP g⁻¹ soil h⁻¹; soil respiration: 4.70 µg CO₂-C g⁻¹ soil h⁻¹). Perturbation analysis showed exudate concentration was the most critical factor, while excessive nitrogen suppressed microbial activity. These findings highlight accession- and stage-specific exudation patterns and the importance of balanced exudate and nitrogen management for improved microbial activity, soil health, and sorghum sustainability.

Keywords: Jowar; Endorhizosphere; Root Exudates; Microbial Activity; RSM Optimization; Nitrogen Management.

Ecofriendly Plant-Based Repellents for a Safe and Sustainable Environment

S. Meenakshi^{1,2,*}, V.S. Varshini³, A. Hafizah⁴ and R. Saravanan⁵

¹Centre for Global Health Research, Saveetha Institute of Medical Sciences, Chennai 602 105, Tamil Nadu, India

²PG and Research Department of Microbiology, Sadakathullah Appa College, (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Tirunelveli 627 011, Tamil Nadu, India

³Department of Microbiology, Bharathidasan University, Tiruchirappalli 620 024, Tamil Nadu, India

⁴Department of Microbiology, B. S. Abdur Rahman Crescent Institute of Science and Technology, Chennai 600 048, Tamil Nadu, India

⁵Department of Zoology, Sri Kumara Gurupara Swamigal Arts College, (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Srivaikuntam 628 619, Tamil Nadu, India

*Corresponding Author – smeenakshi85@gmail.com

Abstract

The increasing awareness of the environmental and health risks associated with synthetic insecticides has accelerated the search for natural, biodegradable alternatives. This study presents the formulation and evaluation of a plant-based insect repellent using clove (*Syzygium aromaticum*), sweet flag (*Acorus calamus*), and garlic peel (*Allium sativum*). Phytochemical screening revealed the presence of key bioactive compounds including flavonoids, terpenoids, tannins, saponins, and steroids, which are known to contribute to antimicrobial and insect-repelling activity. Antibacterial assays conducted using the disk diffusion method demonstrated significant inhibition zones against *Escherichia coli* and *Bacillus subtilis*, confirming the formulation's microbial efficacy. Repellence trials showed that the liquid formulation maintained the highest effectiveness over a six-hour period, followed by solid and powder forms. The use of garlic peel, an agro-waste product, enhances the sustainability profile of the formulation and aligns with principles of green chemistry. These findings support the development of safe, ecofriendly repellents with potential applications in agriculture, public health, and household pest management.

Keywords: Plant-based repellent; *Syzygium aromaticum*; *Acorus calamus*; *Allium sativum*; Phytochemicals; Antibacterial activity; Disk diffusion method; Ecofriendly formulation; Green chemistry; Sustainable pest control.

Exploring the Antibacterial, Antioxidant, Antitubercular and Biosensor Properties of *Vibrio parahaemolyticus* Isolated from *Octopus minor*

D.S. Jincy¹, R. Saravanan^{2,*}, M. Navinchandran³ and S. Meenakshi^{4,5}

¹Research Scholar, Department of Zoology, S.T. Hindu College, (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Nagercoil 629 002, Tamil Nadu, India

²Department of Zoology, Sri K.G.S Arts College, (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Srivaikundam 628 619, Tamil Nadu, India

³Department of Zoology, S.T. Hindu College, (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Nagercoil 629 002, Tamil Nadu, India

⁴Center for Global Health Research, Saveetha Institute of Medical Sciences, Chennai 602 105, Tamil Nadu, India

⁵PG & Research Department of Microbiology, Sadakathullah Appa College (Autonomous), (Affiliated to Manonmaniam Sundaranar University, Tirunelveli), Tirunelveli 627 011, Tamil Nadu, India

*Corresponding Author – saravanankgs79@gmail.com

Abstract

A large and mainly untapped source of bioactive substances with significant therapeutic potential can be found in marine microorganisms. Among these, *Vibrio* species are renowned for generating secondary metabolites with a wide range of biological activities, such as antifungal, antioxidant, and antibacterial qualities. The isolate of *Vibrio parahaemolyticus* from *Octopus minor*, a benthic cephalopod that lives in coastal waters, is the subject of this

study. Examining its potential as a source of bioactive substances with antibacterial, antioxidant, and antitubercular qualities was the goal. Beneficial microbial communities that are essential to defense and metabolism are known to be present in *Octopus minor*. Cephalopod mucus contains antimicrobial peptides and enzymes like lysozyme that support innate immunity and may have an impact on microbial associations. Through biochemical and microbiological analyses, the isolated *V. parahaemolyticus* strain's capacity to generate bioactive compounds was assessed in this investigation. Significant antibacterial activity against specific human pathogens and noteworthy antioxidant potential were found in preliminary results, indicating the presence of secondary metabolites of pharmacological interest. The results demonstrate that *V. parahaemolyticus*, which is marine-derived, can be a promising source of naturally occurring bioactive compounds with potential uses in the biotechnological and pharmaceutical sectors.

Keywords: *V. parahaemolyticus*; bioactive compounds; *Octopus minor*; Cephalopod mucus; pathogen

