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Pharmaceutical importance of phlorotannins from brown algae: Review

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Abstract

Marine research is gaining interest day by day by researchers, due to the presence of a naturally available bioactive compounds in marine organisms. The compounds extracted from marine sources are unique and have different biological activities. Among marine resources the algal bioactive compounds play an important role in the area of health care, pharmaceutical industries, cosmetics, agriculture, etc. Marine brown algae have a unique bioactive compound called phlorotannins, which are polymers of phloroglucinol. Phlorotannins show great health benefits for different health issues and therefore it can be used as a functional ingredient in pharmaceutical industries. This review article focuses on the health benefits and medicinal and pharmaceutical values of phlorotannins.

Key words: Phlorotannins; Bioactive compounds; Brown algae.

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Report of a novel strain *Arthrospira fusiformis* suku-33 isolated from the central Western Ghats, Karnataka

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Abstract

Microalgae are the most fascinating group of organisms exists in nearly all kind of environmental conditions and exhibits array of diversity. India, with luxurious ecological features, nurtures plenty of endemic species in its unique biodiversity hotspots. However, the data for the algal diversity is least focused. The Current study reports, the novel microalgal strain belongs to the class *Cyanophyceae*. The strain is characterized by morphological observation and with the help of 16SrRNA Sequencing. The sequences submitted to the NCBI-GenBank resulted in the close resemblance with the genus *Arthrospira*. Based on the BLAST Hit analysis, the strain number and accession number for the newly identified *Arthrospira fusiformis* SUKU-33 is assigned as MT351134.

Key words: Novel strain; SUKU-33; Microalgae; Blue-green algae; Molecular identification; Algal Bioinformatics; Western Ghats; *Arthrospira fusiformis*.

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Physiological and biochemical response to starvation and excess of nitrogen and phosphorus in *Nostoc spongiaeforme*, a freshwater cyanobacterium

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Abstract

The physiological and biochemical activities of *Nostoc spongiaeforme* Agardh, (a freshwater cyanobacterium) was monitored under different concentration of nitrogen (N) and phosphorus (P). Culture was grown on BG-11 medium containing either control (consisting of standard concentration of nutrients) or starvation of N or P or combine starvation of N and P or double the concentration of N or P at 30°C under continuous white light of 80 $\mu\text{mol photo m}^{-2} \text{ s}^{-1}$ at 150 rpm with photoperiod of 16:8 h. The growth rate and Fv/Fm value declined under P starvation or combined starvation of N and P, however, double the concentration of N or P did not cause any deterioration in the growth and photochemical efficiency of PS II. Further, it was seen that cultures grown in P starving conditions produced a higher level of reactive oxygen species compared to control, which resulted in enhanced production of oxidative damage in the form of malondialdehyde and protein carbonyl content. P starvation and combined starvation of N and P resulted in an upsurge of non-enzymatic antioxidants (proline and ascorbate) content as compared to control. The double the strength of N and P did not reveal any harmful effect on the above-stated parameters. Our study also showed that increase in the actual concentration of N and P three or four times resulted in a reduction in the growth rate. Therefore, from our study, we concluded that P starvation and 3 or 4 times increment in the N and P, posed more oxidative stress than DN and DP, which caused a decreased in the growth rate of *N. spongiaeforme*, a nitrogen-fixing cyanobacterium.

Key words: Ascorbate; Fv/Fm; Malondialdehyde; Proline/Protein oxidation.

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Habitat selectivity of *Haludaria fasciata* (Jerdon, 1849) in two selected streams of Pamba River in the Western Ghats

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Abstract

The habitat preference of an ornamental fish, *Haludaria fasciata* (Jerdon, 1849) from two selected streams of Pamba river in the Western Ghats was conducted from January to December 2019. Thirteen variables were observed during the study period. The fish showed preference to pool habitat with higher structural diversity. These benthopelagic fish is associated with an average p^{H} of 6.3 in both the streams. The shoal of *H. fasciata* consists of 15–30 individuals foraging on organic detritus and small insects. They preferred stream stretches with low water flow. Habitat studies of economically important fishes like *H. fasciata* helps to make in situ conservation and management strategies.

Key words: Habitat selection; *Haludaria fasciata*; Pamba river; Substrate; Environmental variables.

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Gas chromatography-high resolution mass spectrometry analysis of *Sargassum* species

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Abstract

GC-HRMS characterization of *Sargassum cinereum*, *Sargassum ilicifolium*, *Sargassum tenerrimum* and *Sargassum wightii* collected from west coast of Maharashtra was done. Samples were dried, powdered, extracted with methanol and GC-MS analyses were carried out. Components were identified in one fraction prepared from the extract. The chemical constituents of seaweeds were characterized through GC-HRMS and their spectral investigation revealed the presence of different compounds. Among these, Tridecanoic acid, methyl ester, 1-octadecyne, Hexadecanoic acid methyl ester, Pthalic acid, isobutyl octadecyl ester, 9,17-octadecynoic acid (z),methyl ester, Oleic acid and Gamolenic acid are found very significant.

Key words: GC-HRMS; *Sargassum* spp; Seaweed; West Coast of Maharashtra.

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Seasonal studies on limnological parameters of Dah pond at Makhpa, Makhdumpur, Jehanabad, Bihar, India

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Abstract

The present study deals with the seasonal variation on limnological parameters of Dah pond during summer, winter and monsoon. Analysis of various parameters such as water temperature, transparency, pH, dissolved oxygen, free carbon dioxide, carbonate alkalinity, bicarbonate alkalinity, chloride content, silicate, sulphate, total hardness, total nitrogen, phosphate content, biological oxygen demand, gross primary productivity were estimated month wise and finally computed in season wise. The pH (7.7), water transparency (46.12 cm), D.O. (8.1 mg/L) and gross primary productivity (GPP) (1.58 mg C/L/hr) were recorded maximum during winter season. FCO₂ (14.0 mg/L), total hardness (122.6 mg/L), chloride content (11.6 mg/), sulphate (38.0 mg/L) and BOD (4.05 mg/L) were noticed maximum during summer season. The carbonate alkalinity were absent in most of the months and were recorded maximum 21.0 mg /L in the month of January. The chemical nature of water was slightly alkaline, calcium rich and showed bicarbonate type of alkalinity.

Key words: Limnological; Dah; calcium; alkaline.

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Phytochemical and antibacterial studies on selected seaweeds of Thirumullavaram, Kerala

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Abstract

Marine macroalgae are a promising source of bioactive secondary metabolites. The present study evaluate the phytochemical constituents and antibacterial property of five seaweeds, *Ulva fasciata*, *Gracilaria corticata*, *Padina tetrastromatica*, *Dictyota bartayresiana*, and *Sargassum wightii* collected from Thirumullavaram beach of Kollam district, Kerala, India. The seaweeds were finely powdered after shade drying and extracts were prepared using different solvents like distilled water, methanol, ethanol, acetone, diethyl ether and hexane. Phytochemical screening was carried out according to

standard methods. Four fractions (methanol, ethanol, acetone and diethyl ether) were examined for their antibacterial activity using agar well diffusion method against four selected strains of bacteria. The extracts showed the presence of alkaloids, terpenoids, phenols, coumarins, flavonoids, quinines, tannins, steroids and saponins. Hexane extracts of all seaweeds showed poor extraction and hence majority of the secondary metabolites were tested negative. Fluorescence analysis of the powdered thallus was also done with various reagents. Ethanol and acetone extracts showed maximum growth inhibition in all four test organism. Maximum activity was shown by diethyl ether extracts and minimum activity was shown by methanol extracts. All the selected seaweeds showed the presence of secondary metabolites which are important indicators of the antibacterial properties.

Key words: algal phytochemistry; anti-bacterial activities; green and brown seaweeds.

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Copper uptake and its effects on the isolated freshwater cyanobacteria from Ichhapore, West Bengal

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Abstract

The disturbance of aquatic ecosystems aggravated by heavy metal pollution from industrial and domestic sources results in toxicity of food chain, loss of biological diversity, recreational and drinking water. Cyanobacteria play an important role in the clean-up of the aquatic environment. Medium BG 11 (pH 7.4) was used to isolate and culture Cyanobacteria from freshwater habitat from Greater Kolkata and its outskirts and uptake of heavy metal copper (0.05–0.2 mg/l) was studied by Atomic Absorption Spectroscopy (AAS). Effect of copper on chlorophyll and enzymatic and non-enzymatic antioxidants were analysed. Fourier Transform Infrared Spectroscopy (FTIR) studies showed copper binds specifically to the isolated Cyanobacterium. With the help of staining and Scanning Electron Microscopy (SEM) the effects of copper on the morphology of the Cyanobacterium was analysed. Extracellular as well as intracellular deposition of copper and ultrastructural changes in Cyanobacteria was studied by Transmission Electron Microscopy (TEM). Finally, the isolated filamentous Cyanobacterium was identified using 16S rDNA based Molecular Technique. The study aims at effective isolation and identification of the freshwater filamentous Cyanobacterium which was able to uptake copper, its effect on various parameters so that it could be used as a prospective candidate for metal biosorption.

Key words: Cyanobacteria; Heavy metal; Biosorption; Chlorophyll; Antioxidants.

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Groundwater quality assessment of the Cuddalore district, Tamil Nadu, India, using a water quality index method

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Abstract

Cuddalore is an important developed coastal district of Tamil Nadu and is well known as the most prominent natural reservoir. However, such a feature has been compromised due to developmental activities and the lack of conservation water. Accordingly, the main objective of the present study was to evaluate the groundwater quality of the Cuddalore district through Water Quality Index (WQI) and Irrigation Water Quality Analysis (IWQA) parameters.

Physicochemical parameters were used to calculating WQI and IQWA, such as pH, Biological Oxygen Demand, Chemical Oxygen Demand, Total Hardness, Calcium, Magnesium, Chloride, Sulphate, Nitrate, and Total Dissolved Solids. The results showed that the quality of water in sampling stations was more highly affected during Post Monsoon than Pre Monsoon. Most groundwater samples were good enough for drinking without taking up water quality managing activities only during Monsoon, but the seasonal mean variation assessment of the WQI values shows that the overall quality of the district groundwater is very poor and is only suitable for irrigation. A correlation analysis was also performed for analyzing the water quality, and of the results of all the seasons some of the parameters showed perfect positive correlation.

Key words: Water quality index; groundwater; irrigation suitability; Cuddalore; physicochemical parameters and correlation.

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A comparative study on the acute toxicity of biopesticide spinosad and pyrethroid insecticide cypermethrin on Zooplankton *Cyclops viridis* (Jurine, 1820) along with their behavioural changes

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Abstract

The objective of the present study was to compare the acute toxic effects of biopesticide Spinosad and pyrethroid insecticide Cypermethrin on Copepod Zooplankton *Cyclops viridis*. The 24, 48, 72 and 96 h LC₅₀ values of Spinosad on *Cyclops viridis* were 0.79, 0.67, 0.45 and 0.33 ng/l, respectively. The 24, 48, 72 and 96 h LC₅₀ values of Cypermethrin on *Cyclops viridis* were 0.41, 0.22, 0.13 and 0.10 ng/l, respectively. The Mean values (\pm SD) of the percent mortality rate of *Cyclops viridis* varied significantly ($p < 0.05$) at all treatments of both test chemicals irrespective of exposure times (24, 48, 72 and 96 h). A significant variation ($p < 0.05$) in the percent mortality rate of *C. viridis* was also observed at all exposure times at all the doses for both test chemicals. Different behavioural responses like hopping frequency, swimming rate, and angular turns and bends of the zooplankton were primarily increased with the increasing concentrations of the toxicants up to 48 h of exposure but later they were decreased at 72 and 96 h for both toxicants.

Key words: Zooplankton; LC₅₀; Spinosad; Cypermethrin; toxicity; mortality; behavioural responses.

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Diversity of cyanobacteria from paddy fields of Purba Bardhaman District of West Bengal, India

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Abstract

Cyanobacterial diversity from paddy fields of Purba Bardhaman district of West Bengal, India was studied, altogether 33 cyanobacterial forms belonging to 10 genera were recorded. These belonged to 12 heterocystous and 21 non-heterocystous forms. The genera whose members collected were *Aphanocapsa*, *Oscillatoria*, *Phormidium*, *Planktothrix*, *Lyngbya*, *Spirulina*, *Anabaena*, *Nostoc*, *Calothrix* and *Gleotrichia*. The dominant members were *Anabaena* and *Oscillatoria*.

Key words: Diversity; Cyanobacteria; Paddy fields; Purba Bardhaman; West Bengal.

Influence of changes in light intensity, temperature and inoculum size on the growth and pigment composition of microalga – *Nannochloropsis salina*

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Abstract

Light intensity of 1400 lux induced better growth and maximum production of chlorophyll 'a' and carotenoids in *N. salina*. Production of biomass, Chl 'a' and carotenoids reached its peak in *N. salina* cultures incubated at a temperature of 28°C. Growth rates at 20°C and 28°C were observed to be similar. Inoculum density was directly proportional to biomass production and inversely proportional to the growth rate and duration of lag phase. Thus, maximum growth rate was noted in cultures with 5% inoculum. Whereas, maximum biomass, Chl 'a' and carotenoid production were observed in cultures inoculated with 20% inoculum.

Key words: *Nannochloropsis salina*; Microalgae; Temperature; Light intensity; Inoculum size.

Isolation and characterization of L-asparaginase producing endophytic bacterium *Bacillus haynesii* PCPSK1 derived from *Gracilaria* sp.

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Abstract

Marine microbes produce a wide source of bioactive compounds which plays a vital role in the production and manufacture of pharmaceutical, biotechnological, food and industrial products. Seaweeds are one of the large and diverse ecosystems, harboring a number of endophytic and epiphytic bacteria which are essential to sustain the marine environment. Though many enzymes are produced by the marine organisms, microbial L-asparaginase (L-ASNase) is an important enzyme with its application in pharmaceutical and food industries. In this study, 15 endophytic bacterial isolates were obtained from four different seaweeds collected along the coastal regions of Chennai, Tamil Nadu, India. On screening these isolates for L-ASNase production using plate assay method, only one isolate, PCPSK1 was found to be producing L-ASNase. Molecular characterization and phylogenetic analysis confirmed the identity of the isolate PCPSK1 as *Bacillus haynesii*. Bacterial L-ASNase is an important anticancer agent that is administered in leukemia treatment than the traditional sources of these enzymes. This is the first report to reveal the production of L-ASNase by *B. haynesii*, an endophytic bacterium derived from the marine alga *Gracilaria* sp. We conclude that further research on the production and anticancer activity of L-ASNase produced by the isolate *B. haynesii* PCPSK1 may be a promising source with pharmaceutical relevance.

Key words: *Gracilaria* sp.; endophytic bacterium; *Bacillus haynesii*; L-asparaginase.

Effluents from seafood processing industries, its bioproducts and their effect on environment – A review

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Abstract

Seafood processing industry to a greater extent contributes to economic growth of the country. India has a large number of seafood industries along the coastal areas. Seafood processing effluent particularly in developing countries, discharges the effluent into the adjoining environment and water bodies. The discharge of effluent from the industries are toxic to humans and to aquatic ecosystem. These water bodies being mostly gets affected and also causes various ill effect to humans. The effluent discharged from industry, need to be characterized for their compliance to standards by regulatory authorities. Effluent usually contains chemicals, organic matter and microorganisms including pathogens and multi-resistant bacteria. Some of these effluents are untreated or inadequately treated before being discharged, which has become a worrisome phenomenon due to its impact on environmental health and safety.

Key words: Seafood Effluent; Antibiotic resistant genes; Microalgae; Bioproduct.

Seasonal variation in the physicochemical parameters of Vadanage Lake, Kolhapur

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Abstract

Vadanage Lake located around the Kolhapur city. In this study various physicochemical parameters, like Temperature, pH, Electric Conductivity, Total Dissolved Solid, Dissolved Oxygen, Free CO₂, Alkalinity, Hardness, Calcium, Magnesium, Nitrate and Phosphate were studied. The result revealed that the different seasons showed fluctuation in the physicochemical parameters of lake water.

Key words: Limnology; Lake ecology; Vadanage Lake.

Screening and characterization of chitinase producing epiphytic bacterium *Pseudomonas composti* PCPSK2 associated with *Chaetomorpha* sp.

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Abstract

Chitinases, one among the best studied enzymes which hydrolyze chitin, have broad spectrum of distribution in nature. Bacterial chitinases have many biotechnological, pharmaceutical applications and are potential agents for the biocontrol of plant diseases caused by phytopathogenic fungi. Marine bacteria have become an important target for the biotechnology industry for the useful enzymes they produce. In the present study, we explored the production of chitinase by 12 marine bacteria derived from the green alga *Chaetomorpha* sp. which was collected along the coastal regions of Chennai, Tamil Nadu, India. Upon screening for the chitinolytic activity, six isolates were producing clear zone of hydrolysis on colloidal chitin medium by plate assay method. Among the six isolates, the most potential bacterium, PCPSK2 produced pronounced zone of clearance which was selected for further studies. The chitinolytic activity of the PCPSK2, exhibiting degradation of chitin was further supported by scanning electron microscopic analysis. Molecular characterization identified the potential isolate PCPSK2 as *Pseudomonas composti*. Apart from remarkable chitinolytic activity, the strain was also positive for the production of protease, one among the cell wall degrading enzymes and can thus be explored for the biocontrol of phytopathogenic fungal diseases of important crops.

Key words: *Chaetomorpha* sp.; epiphytic bacteria; *Pseudomonas composti*; chitinase.

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New records of two species of *Herposiphonia* (Rhodophyta, Rhodomelaceae) from India

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Abstract

Herposiphonia, a red algal genus comprises of 62 species and are distributed throughout the globe. Four taxa of *Herposiphonia* viz, *H. insidiosa*, *H. prorepens*, *H. secunda* and *H. secunda* f. *tenella* are reported from various coastal regions of India. In the present study, the occurrence of two species of *Herposiphonia* i.e. *Herposiphonia falcata* (Kützting) De Toni, *Herposiphonia subdisticha* Okamura are reported for the first time from the Indian coast and are therefore new additions to the Marine algal flora of India.

Key words: *Herposiphonia falcata*; *Herposiphonia subdisticha*; Kerala; New Record to India; Thirumullavaram.

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Sea grasses – A wellspring of endo-mycobiome for bioactive compound research – A mini review

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Abstract

Most of the research work on Sea grasses in India centered round diversity, taxonomy, nutritional importance and antimicrobial activities of their extract. Investigations on fungal endophytes of Sea grass of the tropics are barely inchoate. Few tropical Sea grasses have been investigated for fungal endophytes from southeast Asia and temperate regions. Only a handful of work carried out in India. This paucity of fungal endophyte research in India has motivated as to write this mini review.

Key words: endo mycobiome; Sea grass; bioactive compounds.

Taxa of Scenedesmaceae from Kolavai Lake in the suburban region of Chennai

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Abstract

Algal taxa of family Scenedesmaceae, inhabiting Kolavai Lake (One of the largest freshwater lakes in the suburbs of Chennai) were studied. The family includes predominantly green microalgae living in polluted water bodies. The members of the family generally form a coenobium. The taxa identified comprised of 37 species belonging to nine genera. Among the nine genera, *Desmodesmus* had the highest number of species (18) followed by *Scenedesmus* with seven species, *Tetradesmus* and *Coelastrum* were represented by three species each. *Tetrastrum* with two species and one each in *Comasiella*, *Hariotina* *Pectinodesmus* and *Verrucodesmus* were also identified.

Key words: Kolavai Lake; Coenobium; Taxa; Microalgae; *Comasiella*; *Verrucodesmus*.