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Journal Information:

Applied Sciences (ISSN 2076-3417) provides an advanced forum on all aspects of applied natural sciences. It publishes reviews, research papers and communications. Our aim is to encourage scientists to publish their experimental and theoretical results in as much detail as possible. There is no restriction on the length of the papers. The full experimental details must be provided so that the results can be reproduced. Electronic files and software regarding the full details of the calculation or experimental procedure, if unable to be published in a normal way, can be deposited as supplementary electronic material.

Section Applied Microbiology

Featured Papers

DOI:10.3390/app11010334

Biosurfactants' Potential Role in Combating COVID-19 and Similar Future Microbial Threats

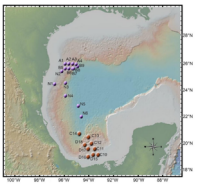
Authors: Pınar Aytar Çelik ,Enuh Blaise Manga ,Ahmet Çabuk and Ibrahim M. Banat

Abstract: During 2020, the world has experienced extreme vulnerability in the face of a disease outbreak. The coronavirus disease 2019 (COVID-19) pandemic discovered in China and rapidly spread across the globe, infecting millions, causing hundreds of thousands of deaths, and severe downturns in the economies of countries worldwide. Biosurfactants can play a significant role in the prevention, control and treatment of diseases caused by these pathogenic agents through various therapeutic, pharmaceutical, environmental and hygiene approaches. Biosurfactants have the potential to inhibit microbial species with virulent intrinsic characteristics capable of developing diseases with high morbidity and mortality, as well as interrupting their spread through environmental and hygiene interventions. This is possible due to their antimicrobial activity, ability to interact with cells forming micelles and to interact with the immune system, and compatibility with relevant processes such as nanoparticle synthesis. They, therefore, can be applied in developing innovative and more effective pharmaceutical, therapeutics, sustainable and friendly environmental management approaches, less toxic formulations, and more efficient cleaning agents. These approaches can be easily integrated into relevant product development pipelines and implemented as measures for combating and managing pandemics. This review examines the potential approaches of biosurfactants as useful molecules in fighting microbial pathogens both known and previously unknown, such as COVID-19.

DOI:10.3390/app11136090

Extra-Heavy Crude Oil Degradation by *Alternaria* sp. Isolated from Deep-Sea Sediments of the Gulf of Mexico

Authors: Lucia Romero-Hernández,Patricia Velez,Itandehui Betanzo-Gutiérrez , María Dolores Camacho-López, Rafael Vázquez-Duhalt and Meritxell Riquelme

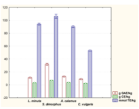


Abstract: The Gulf of Mexico (GoM) is an important source of oil for the United States and Mexico. There has been growing interest, particularly after the Deepwater Horizon oil spill, in characterizing the fungal diversity of the GoM and identifying isolates for use in the bioremediation of petroleum in the event of another spill. Most studies have focused on light crude oil bioremediation processes, while heavy crude oil (HCO) and extra-heavy crude oil (EHCO) have been largely ignored. In this work, we evaluated the ability of fungal isolates obtained from deep-sea sediments of the Mexican economic exclusive zone (EEZ) of the GoM to degrade HCO (16–20° API) and EHCO (7–10° API). *Alternaria* sp., *Penicillium* spp., and *Stemphylium* sp. grew with HCO as the sole carbon source. Remarkably, *Alternaria* sp. was the only isolate able to grow with EHCO as the sole carbon source, degrading up to 25.6% of the total EHCO and 91.3% of the aromatic fraction, as demonstrated by gas chromatography analysis of the saturate, aromatic, and polar fractions. These findings proved to be significant, identifying *Alternaria* sp. as one of the few fungi reported so far capable of degrading untreated EHCO and as a suitable candidate for bioremediation of EHCO in future studies.

DOI:10.3390/app11114745

Antifungal and Antioxidant Potential of Methanolic Extracts from *Acorus calamus* L., Chlorella vulgaris Beijerinck, *Lemna minuta* Kunth and *Scenedesmus dimorphus* (Turpin) Kützing

Authors: Toncho Dinev, Milena Tzanova, Katya Velichkova, Diyana Dermendzhieva and Georgi Beev

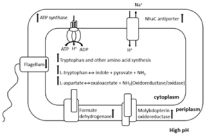


Abstract: Plant extracts are an important alternative to antibiotics, which are ever more restricted because of their developing microbial resistance and some adverse effects that have been observed following frequent application. The aim of the present study was to determine the antifungal and antioxidant activity of the methanolic extracts of *Acorus calamus*, *Chlorella vulgaris*, *Lemna minuta* and *Scenedesmus dimorphus*. The antifungal activity of the extracts against strains of *Aspergillus flavus*, *Aspergillus parasiticus*, *Aspergillus ochraceus*, *Aspergillus niger*, *Aspergillus carbonarius*, *Fusarium graminearum*, *Fusarium oxysporum*, *Penicillium chrysogenum* and *Alternaria alternata* was evaluated via the agar well diffusion method. The antioxidant activity of the extracts was measured through the determination of three parameters—total phenolic content, total flavonoid content and radical scavenging potential (determined through UV/Vis analysis). A. calamus extracts had the highest antimicrobial activity against eight fungal strains, followed by the *C. vulgaris, L. minuta* and *S. dimorphus* extracts, which were inhibitory against two to three strains. Among the extracts from the species studied, the extract from *S. dimorphus* showed the highest antioxidant potential, as determined via the DPPH (1,1'-diphenyl-2-picrylhydrazil-radical) method. This correlated to its high total phenolic and flavonoid content. From *A. calamus* and *L. minuta*, methanolic extracts were obtained that exhibited similar values of the aforementioned parameters, followed by *C. vulgaris* extracts, which showed the lowest antioxidant activity. Based on the Pearson correlation coefficients, the impacts of the total phenolic content and the total flavonoid content on radical scavenging capacity are similar, and flavonoids were a significant part of the total phenolic compounds extracted from the plant materials studied.

DOI:10.3390/app11052201

Sulphate-Reducing Bacteria's Response to Extreme pH Environments and the Effect of Their Activities on Microbial Corrosion

Authors: Thi Thuy Tien Tran, Krishnan Kannoorpatti, Anna Padovan and Suresh Thennadil



Abstract: Sulphate-reducing bacteria (SRB) are dominant species causing corrosion of various types of materials. However, they also play a beneficial role in bioremediation due to their tolerance of extreme pH conditions. The application of sulphate-reducing bacteria (SRB) in bioremediation and control methods for microbiologically influenced corrosion (MIC) in extreme pH environments requires an understanding of the microbial activities in these conditions. Recent studies have found that in order to survive and grow in high alkaline/acidic condition, SRB have developed several strategies to combat the environmental challenges. The strategies mainly include maintaining pH homeostasis in the cytoplasm and adjusting metabolic activities leading to changes in environmental pH. The change in pH of the environment and microbial activities in such conditions can have a significant impact on the microbial corrosion of materials. These bacteria strategies to combat extreme pH environments and their effect on microbial corrosion are presented and discussed.

Aims and Scope

The journal covers all aspects of applied physics, applied chemistry, engineering, environmental and earth sciences, and applied biology. It has 5 broad subjects:

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Agricultural Science and Technology

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Green Sustainable Science and Technology
Earth Sciences and Geography

Physical Sciences:
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Optics and Lasers
Acoustics and Vibrations
Applied Physics
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Biomedical Engineering

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