Potential of a Mauritian Mangal as a Source for Antibacterial Marine Microbial Natural Products

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Abstract

Infectious diseases represent a major threat to human health. Prior to the emergence of antibiotic treatment, many people could not survive common bacterial infections. The exploitation of terrestrial microorganisms has led to the discovery of several classes of antibiotics such as β-lactam, aminoglycosides, glycopeptides, tetracyclines, macrolides and lincosamides. Even though these antibiotics have worked effectively against bacterial infections for over 70 years, pathogenic bacteria are developing resistance mechanisms against these antibiotics through hydrolysis, efflux, altered target, phosphorylation, acetylation, nucleotidylation, reprogramming peptidoglycan biosynthesis, mono oxygenation, glycosylation, C-O lyase, acetylation and ADP-ribosylation. There is therefore an urgent need to explore new habitats which harbour microorganisms that are potential candidates for the production of novel metabolites. Mangrove ecosystems are unique and shelter a wide variety of halophilic microorganisms that still remain largely unexplored and potentially represent an excellent source for marine biotechnology exploitation to produce novel bioactive metabolites. In this study, the antimicrobial activities of microorganisms isolated from a mangrove forest in the south-east coast of Mauritius were investigated. Sediment samples were randomly taken from five stations of the mangrove forest at low tide in the month of August which is in the winter season in Mauritius. Physico-chemical parameters such as salinity, pH, sediment temperature and luminosity were measured. The microorganisms were extracted and cultured on Zobell Marine Agar and strains isolated were characterised by Gram staining and microscopy. Antimicrobial susceptibility tests were carried out for four randomly chosen gram positive isolates by disc diffusion and broth dilution method against Escherichia coli, Pseudomonas aeruginosa, Staphylococcus epidermidis and Staphylococcus aureus. The pH of the stations varied between 6.00 and 7.50 at low tide. The salinity measured in situ had a lowest value of 6.0 ppm and a highest value of 7.5ppm. The
sediment temperature ranged between 21.5-27.9°C. The luminosity values were found in the range of 950-4200 at midday. Microbial strains with a range of phenotypic characteristics were isolated from the sediments. The major variation in pigmentation was between the colours red, orange, yellow and white. Some of the colonies were wet and creamy while others were dry. The shapes of the most of the colonies were circular, rhizoid-shaped and mycelium-like structure. The majority were gram positive. The crude extract from one strain showed bacteriocidal activity against *E. coli* while three other strains showed bacteriostatic activity on *E. coli* and *S. aureus*. These results indicate the potential for antimicrobial properties of microbes from the mangrove soil and suggest that mangals of Mauritius harbour potent microorganisms, which could synthesise new bioactive compounds of pharmacological significance.

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