

TITLE: DIVERSITY OF BIOSURFACTANTS PRODUCED BY BACTERIA ISOLATED FROM MANGROVES REVEALED BY FOURIER TRANSFORM INFRARED SPECTROSCOPY

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ABSTRACT:

Microbial surfactants are a natural class of surface-active molecules with innumerable potential applications in food, petroleum, pharmaceutical and biotechnological industries. When compared with the synthetic counterparts, biosurfactants present many appealing features, such as less or no toxicity, renewability of resources, biodegradability, high activity and tolerance to extreme pH, temperature and salinity. These molecules constitute a heterogeneous group being classified according to their structure comprising mainly fatty acids, glycolipids, lipopeptides and lipoproteins. Understanding their chemical structure is essential to define their application. The study aimed the analysis of the chemical composition of 31 biosurfactants produced by bacterial strains previously isolated from mangrove sediments in Baía de Todos os Santos (Bahia - Brazil) and Jaguaribe, Icapuí and Timonha (Ceará – Brazil) using Fourier Transform Infrared Spectroscopy - FTIR. For biosurfactant production the strains were cultivated in Erlenmeyer flasks with Mineral Medium (MM) containing glucose as carbon source at 30 °C under 150 rpm for 48 h. To recover the crude biosurfactants the cell-free supernatants were subjected to acid precipitation and lyophilization. The obtained biosurfactants were characterized by FTIR using a Vertex 70 infrared spectrometer operating in attenuated total reflection (ATR) mode. The FTIR spectra, with a resolution of 4 cm⁻¹, were collected from 600 to 4000 (cm⁻¹) wavenumbers, and are an average of 32 scans in an inert atmosphere of N₂. The obtained data showed characteristic absorption bands to specific functional groups such as bands at 1200-1340 cm⁻¹ and 1510-1650 cm⁻¹, respectively indicating amine groups and peptide bonds, and also bands at 1370-1470 cm⁻¹ and 830-1000 cm⁻¹ related to the presence of alkanes and alkenes, suggesting a lipopeptide composition. The molecules from the Baía de Todos os Santos mangrove presented more bands related to amine groups when compared to the biosurfactants from the Ceará mangroves. The opposite relationship was found for the bands related to the aliphatic chain. The bacterial strains studied herein produced diverse lipopeptide isoforms that suggest that these variances can be approached for different industrial applications.

Keywords: biosurfactant, FTIR, lipopeptides, mangrove

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