P1.77 - HARNESSING THE QUEST FOR ECO-FRIENDLY ALTERNATIVES TO CHEMICAL SURFACTANTS BY EXPLORING EXTREME SALINITY ENVIRONMENTS

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ABSTRACT

Surfactants are tensioactive chemical compounds extensively used worldwide in a myriad of industrial sectors, being an essential part of our everyday lives. They are present in numerous products including cosmetics, detergents, fabric softeners, toothpaste, paints, among many others, and millions of tonnes of surfactants are manufactured every year. Most commercially available surfactants are non-renewable petroleum-based compounds whose extensive use may lead to profound environmental impact. The increasing environmental awareness has prompted the search for new environmentally friendly alternatives, including the so-called biosurfactants, which are surfactants produced by microorganisms that are sustainable alternatives to their chemical counterparts. Hypersaline environments are an attractive source of microbial communities that, due to their adaptation to extreme abiotic conditions, produce special secondary metabolites constituting hotspots for the discovery of new biosurfactants.
Sampling campaigns were conducted at strategic hypersaline locations holding distinct features namely Peña Hueca lagoon (hypersaline sulphated lagoon, Spain), and salinas of Pedra de Lume (salinas in an extinct volcan crater, Cape Verde), of Aveiro (solar coastal salina, Portugal) and Rio Maior (terrestrial inland salina, Portugal). Culture-dependent and metagenomic approaches were carried out to unveil the microbial diversity and identify the most promising biosurfactant-producing organisms.
Physicochemical characterization of samples showed an interesting variability in terms of salinity, pH and ionic content. Sequence-based metagenomics revealed that the isolated metagenomes are enriched in genes involved in biosurfactant production. Culture-dependent techniques allowed the identification of halophilic microbes with remarkable surfactant-like properties. Among them, a particular isolate was found to simultaneously produce a biosurfactant and a bioemulsifier, which was characterized in detail.
The bioprospection of hypersaline locations of the Iberian Peninsula and Cape Verde allowed the identification of halophilic biosurfactant producers, which can have promising industrial applications and contribute to the quest for more sustainable alternatives to chemical surfactants.

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