

Isolation and characterization of biosurfactant produced by *Natrinema gari* sp., a halophilic archeon isolated from saline soils of Chott El Hodna-M'sila, Algeria.

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Abstract

Biosurfactant (BS) are a type of surface-active molecules that reduce the interfacial tension between two liquids, or that between a liquid and a solid. Their unique property like, nontoxic, easily biodegradable, eco-friendly and high stability, and wide variety of industrial application makes them highly useful group of chemical compound. BS are produced from variety of microorganisms. The objective of this study was to isolate and characterize the BS producing by *Natrinema gari* sp., halophilic archeon isolated from saline soils of Chott El Hodna, M'sila-Algeria and identified by 16S rRNA sequencing. BS production ability was evaluated by carrying out drop collapse and oil spreading tests, measurement of surface tension and estimation of emulsification activity. Properties of this BS were determined like characterization of BS by TLC and GC-MS methods. It was analysed and identified as lipid-biosurfactant and GC-MS analysis revealed that they are predominantly made up of a benzene with a percentage of 50%, and a mixture of fatty acids (palmitic acid, stearic acid and linoleic acid).

Keywords

Natrinema gari sp., biosurfactants, *Haloarchaea*, GC-MS, fatty acids, screening.

1. Introduction

Biosurfactants are a chemically diverse group of surface-active molecules produced by various groups of microorganisms that may belong to yeast, bacteria, filamentous fungi, plants and animals. Surfactants manufactured by the chemical industry pose environmental problems because of their toxicity and resistance to degradation. There is currently interest in replacing these chemical surfactants with surfactants of biological origin. In the last decades, these biosurfactants have attracted attention of many scientists because of their potential advantages over their synthetic relatives. These advantages include low toxicity (environmentally friendly), high biodegradability and biodegradable, high selectivity and specific activity, availability of its raw material where biosurfactant can be produced from cheap raw materials, which are available in large quantity. Biosurfactants can also be produced from industrial wastes and by-products and this is of particular interest for bulk production (e.g. for use in petroleum related technologies). Also it is possible to produce biosurfactants in situ at contaminated sites.

Biosurfactants are categorized mainly by their chemical composition and their microbial origin. In general, their structure includes a hydrophilic moiety consisting of amino acids or peptides anions or cations; mono-, di-, or polysaccharides; and a hydrophobic moiety consisting of unsaturated, saturated, or fatty acid. Biosurfactant have been classified into: Lipopeptides and lipoproteins, glycolipids, Polymeric, fatty acids, phospholipid, neutral lipids and particulate biosurfactant [1].

This study investigated the isolation and characterization of biosurfactant produced by *Natrinema gari* sp., isolated from saline soils of Chott El Hodna, M'sila-Algeria.

2. Materials and methods

2.1. Area study

Chott El Hodna is a shallow saline lake in Algeria; it is located within an endorheic basin in North-Central of Algeria (lat. 35°18'/35°32', long. 4°15'/5°05'). It was classified as humid zone of international importance by the RAMSAR convention in 2001.

2.2. Bacterial strain and culture growth conditions

Natrinema gari sp. was maintained in Sehgal Gibbons Medium which has following composition (g/L): NaCl, 250; MgSO₄.7H₂O, 20; KCl, 2; sodium citrate (trisodium salt), 3; casamino acids, 7.5; yeast extract, 1 and