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Exploring the Biosurfactant Potential of Actinobacteria Isolated from *Ruta graveolens*

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Abstract

Background: Biosurfactants are surface-active compounds known for their emulsifying properties and numerous advantages, including low environmental toxicity, eco-friendliness, biodegradability and acceptability. These molecules are amphiphilic, containing both hydrophilic and hydrophobic ends, allowing them to interact at the aqueous-non-aqueous interface [1]. Bacterial biosurfactants are interesting due to their various fields of applications, including biomedicine, cosmetics, food, pharmaceutics, water treatment and oil recovery [2]. Actinobacteria are an important group of microorganisms with high potential for producing different bioactive metabolites including antimicrobial, anticancer and other pharmaceutical compounds [3]. Medicinal plants, such as *Ruta graveolens*, are a rich source of bioactive compounds, and the association of actinobacteria endophytes with such plants are an attractive source for bioprospecting for novel compounds with biomedical and industrial applications [3]. **Objective:** The purpose of this study was to explore the biosurfactant activity of actinobacterial strains previously isolated from *R. graveolens*. **Methods:** Fifteen previously isolated actinobacterial strains were inoculated into 100 mL Erlenmeyer flasks containing 30 mL of Kim's broth supplemented with 3% filtered olive oil as a hydrophobic carbon source. After two weeks, biosurfactant production was analyzed by measuring the emulsification activity. **Results:** Eight out of the 15 actinobacterial strains showed emulsification activity. All results were compared with a positive control consisting of Triton X100 (1mg/ml), and a negative control consisting in Kim's broth. Almost all strains that revealed positive activity are affiliated to the actinobacterial species *Tsukamurella tyrosinosolvens* (7/8), with one strain belonging to the species *Microbacterium gisengiterae*. Comparative analysis with the positive control (with an emulsification activity of 60%), indicated that 3/8 samples showed high emulsification activity (>40%), 1 showed moderate activity (37%) and 4/8 showed low/moderate activity (20-30%). **Conclusions:** The subsequent phases of this study will involve analyzing if the potential biosurfactant compounds can reduce the surface tension and if they can represent new molecules.

Keywords: actinobacteria; medicinal plant; *Ruta graveolens*; biosurfactant

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References

1. Rani, M.; Weadge, J. T.; Jabaji, S. Isolation and Characterization of Biosurfactant-Producing Bacteria From Oil Well Batteries With Antimicrobial Activities Against Food-Borne and Plant Pathogens. Front Microbiol (2020), 11, 64.
2. Ceresa, C.; Fracchia, L.; Sansotera, A.C.; De Rienzo, M.A.D.; Banat, I.M. Harnessing the Potential of Biosurfactants for Biomedical and Pharmaceutical Applications. Pharmaceutics (2023), 15, 2156.
3. Golinska, P.; Wypij, M.; Agarkar, G.; Rathod, D.; Dahm, H.; Rai, M. Endophytic actinobacteria of medicinal plants: diversity and bioactivity. Antonie Van Leeuwenhoek (2015), 108(2), 267-89.