IMPROVED RHAMNOLIPID BIOSURFACTANT PRODUCTION BY BURKHOLDERIA THAILANDENSIS E264 USING AGRO-INDUSTRIAL WASTE

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Body

Biosurfactants are amphiphilic surface-active compounds, produced by various microorganisms, that reduce surface and interfacial tension. These compounds are attracting increasing interest over their chemical counterparts due to their advantages, such as biodegradability, high stability in extreme environments, low toxicity, low critical micelle concentrations (CMC) and the fact that they can be effectively produced from agro-industrial wastes and renewable resources. Furthermore, their diversity allows for a significant number of uses, including microbial enhanced oil recovery (MEOR), bioremediation and biomedical applications. However, the high operational costs, mainly regarding the use of expensive raw materials in the fermentation and the complex downstream processing, to yield low amounts of product restricts their industrial-scale applications. Several attempts to solve these limitations by reducing the production costs have been conducted and include the use of low-cost agro-industrial wastes and by-products as substrates. One of these low-cost substrates, that has been successfully used to produce biosurfactants by *Bacillus subtilis* and *Pseudomonas aeruginosa* strains, is Corn Steep Liquor (CSL). In this research, rhamnolipid biosurfactant production by *Burkholderia thailandensis* E264 was optimized using this agro-industrial waste as sole substrate. When grown in a culture medium containing CSL (7.5% v/v), this strain produced 1.77 g biosurfactant/L, which is about 2.6 times the amount of biosurfactant produced in the standard synthetic medium. The purified biosurfactant produced in the low-cost medium exhibited similar surface-active properties when compared with that produced in the synthetic medium, reducing the surface tension of water to 29.7 mN/m, with a CMC of 385 mg/L. HPLC analysis showed that the culture medium used contains about 2.6 g/L of fructose and 2.5 g/L of glucose, that are fully consumed within the first 48 h of fermentation. Since the synthetic medium contains 40 g/L of glycerol, results suggest that biosurfactant production is more efficient in the low-cost medium. Furthermore, to the best of the authors' knowledge, this is the first experimental research that combines the utilization of *B. thailandensis* with CSL to produce biosurfactants with very optimistic results in terms of cost and production levels. The rhamnolipid-containing cell-free supernatant could be used directly in bioremediation or MEOR processes.

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Palavras-chave : Biosurfactant, Corn Steep Liquor, Burkholderia thailandensis, Microbial Enhanced Oil Recovery, Bioremediation