Improved biosurfactant production by a *Pseudomonas aeruginosa* strain using agro-industrial wastes

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Microbial surfactants are amphipathic molecules produced by a variety of microorganisms that exhibit pronounced surface and emulsifying activities. Biosurfactants can replace synthetic surfactants in environmental and industrial applications, such as bioremediation and microbial enhanced oil recovery. Furthermore, some biosurfactants have been reported as suitable alternatives to synthetic medicines and antimicrobial agents and may be used as effective therapeutic agents, due to their antibacterial, antifungal, antiviral and anti-adhesive activities. The main advantages of biosurfactants when compared with synthetic surfactants include their diversity, specificity, environmentally friendly nature, non-toxicity and high biodegradability, effectiveness at extreme temperatures or pH values, as well as their suitability for scale-up production. Many of the potential applications that have been considered for biosurfactants depend on whether they can be produced economically at large-scale. Several efforts have been conducted to reduce production costs, including the use of agro-industrial wastes as substrates, optimization of medium and culture conditions and efficient recovery processes. In this work, biosurfactant production by a *Pseudomonas aeruginosa* strain isolated from a crude oil sample was optimized using agro-industrial wastes. A culture medium containing corn step liquor (10% v/v) and molasses (10% w/v) led to the production of 5 g biosurfactant/l, which is about ten times the amount of biosurfactant produced when using LB medium. The crude biosurfactant reduced the surface tension of water to 31 mN/m and exhibited high emulsifying activity (60%), with a critical micelle concentration of 200 mg/l. Moreover, it showed antimicrobial activity against a broad range of Gram-positive and Gram-negative bacteria, as well as a high efficiency in removing oil from contaminated sand, when compared with chemical surfactants. The results obtained suggest the possibility of using this biosurfactant as an alternative to traditional chemical surfactants.