

# Biosurfactant Production by Marine Sponge-Associated Bacteria Using Waste Cooking Oil as Substrate and Its Application

Chayanon Chotirotsukon<sup>1</sup>, Chutiwan Dechsakulwatana<sup>2</sup> and Onruthai Pinyakong<sup>1</sup>

<sup>1</sup>Department of Microbiology, Faculty of Science, Chulalongkorn University;

<sup>2</sup>Institute of Marine Science, Burapha University,

Tel: 086-387-3837, e-mail: C\_Chotirotsukon@hotmail.com

**Abstract:** The success of bioremediation of petroleum hydrocarbon-contaminated sites is limited because of the relatively low water solubility of such compounds. The bioavailability of hydrophobic compounds can be enhanced by biosurfactants which are amphiphilic compounds capable of reducing surface tension and interfacial tensions. In general, biosurfactants are produced by microorganisms in order to utilize their insoluble growth substrates. However, the production cost of biosurfactants is still high and thus limits their commercial success. The utilization of low-cost substrates such as waste cooking oil is one of the alternative strategies for reducing the cost of production as well as environmental pollution. In this study, biosurfactant production was performed using bacteria associated with a marine sponge inhabiting the Gulf of Thailand. A total of 46 sponge-associated bacteria were isolated and screened for the potent biosurfactant producing strains by using waste cooking oil as substrate. The isolated bacteria were selected by using different methods including blood hemolysis, drop collapse, oil displacement, emulsification activity, lipase activity, and surface tension. The results showed that strain TL401 is the efficient strain for biosurfactant production. Based on 16S rDNA, strain TL401 was identified as *Pseudomonas* sp. with 99% similarity. TL401 cell free supernatant had ability to decrease the surface tension of liquid medium from 61.9 to 32.5 mN/m and exhibited positive results for oil displacement test. The highest biosurfactant production was achieved after 88 hours of growth. The biosurfactant was highly stable over a range of temperature 4-121°C. In addition, the potential application of biosurfactant for enhanced biodegradation of diesel oil in liquid medium was investigated. The results demonstrated that an addition of biosurfactant increased diesel oil biodegradation percentage from 33.4 to 62.7%. This information indicated that the biosurfactant produced by this isolate has potential for further bioremediation of petroleum hydrocarbons contaminated environments.

**Keywords:** biosurfactant, sponge, bioremediation, waste cooking oil

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