Comparison of biosurfactants produced by the Antarctic hydrocarbon-degrading *Pseudomonas* sp. ADL15 and *Rhodococcus* sp. ADL36 and their characterization

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Polar environments such as Antarctica are continuously subjected to anthropogenic pollution especially hydrocarbon contamination (Soares da Silva *et al*., 2017). Bioremediation of hydrocarbon contaminants using microbial species is an attractive approach due to the production of surface active agents, which reduce the surface tension of hydrophobic substrates, thus enhancing hydrocarbon degradation (Varadavenkatesan and Murty, 2013). This research was aimed at investigating the ability of two hydrocarbon-degrading Antarctic isolates in synthesising biosurfactants and characterising the components of the biosurfactants produced by both strains. The presence of biosurfactant was qualitatively evaluated using the drop collapse and oil spread tests, which displayed a positive result for the production of biosurfactants for both strains. The emulsification index test (E_{24}) was carried out as a quantitative method to detect the presence of biosurfactant. The emulsification indices for isolates ADL15 and ADL36 were 48.6% and 55.5%, respectively (Table 1). The biomolecule content of biosurfactants was determined by performing the phenol-sulphuric assay (carbohydrate), Lowry assay (protein) and Soxhlet extraction (lipid) (Table 2). The biosurfactant from isolate ADL36 showed higher carbohydrate and protein content of 0.11 mg/mL and 0.40 mg/mL, respectively, compared to the biosurfactant from isolate ADL15 at 0.05 mg/mL and 0.21 mg/mL, respectively. However, the lipid content was higher in strain ADL15 (80%) than strain ADL36 (62%). This might due to the different optimum growth conditions for each strain. The results demonstrate that biosurfactants were produced by both bacteria during the microbial degradation of diesel.

Table 1. Detection of biosurfactants

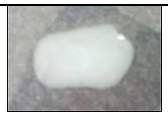
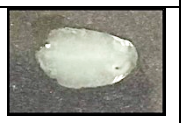
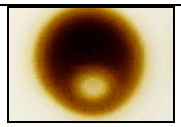
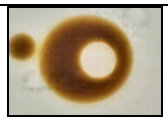
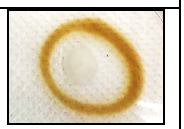
Test	Control	ADL15	ADL36
Drop collapse			
Oil spread			
EI (%)	-	48.6	55.5

Table 2. Determination of protein, lipid and carbohydrate content of biosurfactants

Biomolecule(s)	ADL15	ADL36
Protein	0.33 mg/ml	0.54 mg/ml
Carbohydrate	0.04 mg/ml	0.07 mg/ml
Lipid	80%	62%

References

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