Optimization of Crude Oil Degradation by Mutant Strains of Biosurfactant Producing Bacterial Isolates using Ultra Violet Radiation

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Abstract

Strain improvement through mutagenesis plays a role in the biotechnological advancement of bacterial degrading process. The study investigated optimization of crude oil degradation through mutation of biosurfactant producing bacterial isolates using ultra violet radiation. Bacterial isolates that demonstrated a high output of crude oil degradation and biosurfcatant production were treated with ultra violet radiation (UV) for strain improvement. The mutated strains and wild type were assayed for crude oil degradation and biosurfactant production for a duration of 35 d. Parameters analysed at every 7 d interval were bacterial growth, change in pH, total petroleum hydrocarbon (TPH) content and biosurfactant concentration. Biosurfactants produced were characterized using Fourier-transform infrared spectroscopy (FTIR) analysis and genes for biosurfactant production and crude oil degradation were detected. The results showed that Pseudomonas aeruginosa P73 mutant strain had the highest cell growth and lowest TPH content of 2.395 ± 0.00nm and 0.112 ± 0.18 mg/L respectively at day 35. The FTIR result revealed that all biosurfactants produced were Rhamnolipids. The mutant P. aeruginosa P73 recorded the highest number of catabolic genes for crude oil degradation. The mutant P. aeruginosa P73 improved degradation of crude oil by 33% as compared to the wild type. The study revealed that UV was an effective mutagen for strain improvement for optimization of crude oil degradation.

Keywords

Crude oil, Biosurfactant, UV radiation, Mutant, Degradtion.