

Isolation, Identification and Crude Oil Biodegradation Potential of *Providencia* sp. BAZ 01

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Abstract : Due to growing issues of crude oil pollution in both marine and terrestrial environments, Billions to Trillions of US Dollars were spent over the years for the treatment of this spill. There is an urgent need for effective bioremediation strategies. This current study focuses on the isolation and characterization of a crude oil-degrading bacterium from hydrocarbon-contaminated soil samples. Soil samples were collected from an oil spill site and subjected to enrichment culture techniques in a mineral salt medium supplemented with crude oil as the singular carbon source. The isolates were screened for their crude oil-degrading capabilities using gravimetric analysis. The most efficient isolation was identified through 16S rRNA gene sequencing. Cultural and physical conditions such pH, temperature salinity and crude oil concentrations were optimized. The isolates showed significant crude oil degradation efficiency, reducing oil concentration (2.5%) by 75% within 15 days of incubation. The strain was identified as *Providencia* sp. through molecular characterization, the sequence was deposited at the NCBI Genbank with accession number MN880494. The bacterium exhibited optimal growth at 32.5°C, pH 7.0 to 7.5, and in the presence of 1.5% (w/v) NaCl. The isolated *Providencia* sp. shows encouraging potential for bioremediation of crude oil-contaminated environments. This study successfully isolated and characterized a crude oil-degrading *Providencia* sp., highlighting its potential in bioremediation.

Keywords : crude oil degradation, *providencia* sp., bioremediation, hydrocarbon utilization, environmental pollution.

Conference Title : ICBB 2024 : International Conference on Biotechnology and Bioengineering

Conference Location : Jeddah, Saudi Arabia

Conference Dates : November 11-12, 2024