

## عنوان مقاله:

Isolation and Identification of Phenanthrene-degrading Bacteria and Increasing the Biodegrading Ability by Synergistic Relationship

## محل انتشار:

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## خلاصه مقاله:

Background: Polycyclic aromatic hydrocarbons are a large group of oil contaminants with carcinogenic, mutagenic and teratogenic effects. The release of these compounds in soil destroys animals, plants and microbial diversity and has several negative impacts on physical properties of the soil including the destruction of soil aggregates reduction in pores, and increase in soil bulk density. Many strains of microorganisms isolated have the phenanthrene-degrading ability but this study focused on isolation and identification of a phenanthrene-degrader bacterium for bioremediation of contaminated soils. Background: Polycyclic aromatic hydrocarbons are a large group of oil contaminants with carcinogenic, mutagenic and teratogenic effects. The release of these compounds in soil destroys animals, plants and microbial diversity and has several negative impacts on physical properties of the soil including the destruction of soil aggregates reduction in pores, and increase in soil bulk density. Many strains of microorganisms isolated have the phenanthrene-degrading ability but this study focused on isolation and identification of a phenanthrene-degrader bacterium for bioremediation of contaminated soils. Materials and Methods: Enrichment technique was used for isolation and the most effective isolates, were named pseudomonas aeruginosa ZF<sub>1</sub> and Serratia marcescens ZF<sub>2</sub>. The degradation experiments were conducted in the mineral salt medium (MSM) containing phenanthrene as the sole source of carbon and energy. The selection was based on phenanthrene biodegradation abilities. The isolates were identified using morphological, biochemical tests and 16S rDNA sequencing and after 10 days' incubation at 30 °C and pH = 7, the bacterial growth and Phe-degrading rate were evaluated by protein assay (Bradford) and gas chromatography (GC), respectively. Results: Biochemical tests and 16s rDNA gene sequence analysis revealed that isolated bacteria are similar to Pseudomonas aeruginosa ZF<sub>1</sub> and Serratia marcescens ZF<sub>2</sub> with 99% similarity. The results showed a mixture of ZF<sub>1</sub> and ZF<sub>2</sub> bacteria could degrade 83% at minimum concentrations of 200 ppm of phenanthrene whereas single strain culture of two bacteria had poor degradation abilities (less than 15%). Conclusion: Results showed that isolated co-culture bacteria have high potential to degrade phenanthrene with the best results achieved when the enriched consortium was used and this mixture was shown to be an appropriate candidate for bioremediation purposes.

## کلمات کلیدی:

Phenanthrene, Co-culture, Biodegradation

