Water Air Soil Pollut (2024) 235:797
https://doi.org/10.1007/s11270-024-07586-4

Identifying Bacteria from Urban Soil for Degrading Soil Organic Contaminants of Emerging Concern

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Received: 17 June 2024 / Accepted: 17 October 2024 / Published online: 8 November 2024

Abstract Fluoranthene (Flu) is an ubiquitous, carcinogenic, high molecular weight tetracyclic polycyclic aromatic hydrocarbon whose increased accumulation in soil is matter of concern worldwide. In urban areas, an upsurge in population, industrialization and transportation activities has led to significant increase in the concentration of soil pollutants, such as Flu. Consequently, its concentration exceeds the carcinogen exposure risk thresholds in many urban areas, highlighting the urgent need for cost-effective and sustainable mitigation strategies. There has been an increased interest in microbe-mediated remediation in order to address this soil pollutant. In the present study, three Flu-degrading bacteria, *Bacillus* sp. VMF1, *Bacillus* sp. VMF2 and *Bacillus licheniformis* VMF3, have been isolated from urban soil of Delhi. Growth kinetic rate of three isolates was examined under a range of conditions of temperature, pH and salinity at five different concentrations of Flu. Additionally, their potential to degrade petroleum hydrocarbons was assessed. All isolates showed > 90% degradation of Flu at different concentrations. GC–MS analysis of broth cultures indicated the presence of compounds such as Dibutyl phthalate and Phenol,3,5-bis(1,1-dimethyl ethyl)- suggesting the involvement of phthalic acid pathway in Flu degradation. All isolates showed high growth kinetics under different pH and temperature condition at higher Flu concentration. Interestingly, these bacteria showed adaptation to high saline conditions, with enhanced growth and degradation efficiency. All isolates demonstrated promising capabilities in degrading petroleum hydrocarbons. Our findings thus underscore their adaptability and efficiency, making them promising candidates

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s11270-024-07586-4.

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