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Bio and phyto-remediation of oil contaminated soils: Laboratory and field experiments

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Oil pollution as an environmental challenge has been widespread during production, storage and transport activities. Although, there are several chemical and physical methods for remediation of oil contaminated soil and water resources, biological methods are promising and cost effective tools for large scale remediation. Bioremediation is highlighted as an environmental friendly method which uses capability of microorganisms and/or plants (i.e. phytoremediation) to degrade, remove, stabilize and reduce environmental pollutants. This study has been carried out to remediate soils contaminated with petroleum hydrocarbons in both laboratory and field conditions in Tehran refinery, Iran. Oil-degrading bacteria were isolated, identified and selected from the contaminated soil samples and the inoculants were used as a microbial-enrichment treatment during 2 and 4 months in laboratory and field conditions, respectively. Furthermore, phytoremediation efficiency of oil contaminated soils using tall fescue (*Fesctuca arundinacea Schreb*) was investigated during a period of 7 months in greenhouse and a period of 4 months in field conditions. Results revealed that soil microbial enrichment by using of oil-degrading species could remove more than 50% of total petroleum hydrocarbons (TPHs) and polycyclic aromatic hydrocarbons (PAHs) after 2 months. Although planting could enhance dissipation of TPHs and PAHs by 70 to 100% in some soils, it was not efficient in highly polluted soils in field conditions. Plant interaction with endophytic fungi which lived asymptomatically inside the plant shoots could enhance removal of soil TPHs in greenhouse conditions. However, their effect has been not investigated in the field conditions yet. The overall conclusion is that although the mentioned biological methods, especially bacterial enrichment, are useful for reclamation of oil contaminated soils, these approaches would be more desired if the efficiency of the methods is enhanced.

Biography

Mohsen Soleimani has obtained his PhD in the field of soil pollution from Isfahan University of Technology, Iran with collaboration of University of Copenhagen, Department of Basic Sciences and Environment where he carried out some parts of his PhD project. He is assistant professor of Department of Environmental Sciences, Isfahan University of Technology and has cooperated in several research projects in the field of environmental science and engineering, bioremediation and phytoremediation. He has published more than 15 papers in reputed journals, national and international conferences and 2 book chapters. He is serving as an editorial board member of Journal of Bioremediation & Biodegradation and also collaborating with several international reputed journals as a referee.

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