

Potential of Native Microorganisms in Tagus Estuary

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Abstract : The Tagus estuary is heavily affected by industrial and urban activities, making bioremediation studies crucial for environmental preservation. Fuel contamination in the area can arise from various anthropogenic sources, such as oil spills from shipping, fuel storage and transfer operations, and industrial discharges. These pollutants can cause severe harm to the ecosystem and the organisms, including humans, that inhabit it. Nonetheless, there are always natural organisms with the ability to resist these pollutants and transform them into non-toxic or harmless substances, which defines the process of bioremediation. Exploring the microbial communities existing in soil and their capacity to break down hydrocarbons has the potential to enhance the development of more efficient bioremediation approaches. The aim of this investigation was to explore the existence of hydrocarbonoclastic microorganisms in six locations within the Tagus estuary, three on the north bank: Trancão River, Praia Fluvial do Cais das Colinas and Praia de Algés, and three on the south bank: Praia Fluvial de Alcochete, Praia Fluvial de Alburrica, and Praia da Trafaria. In all studied locations, native microorganisms of the genus *Pseudomonas* were identified. The bioremediation rate of common hydrocarbons like gasoline, hexane, and toluene was assessed using the redox indicator 2,6-dichlorophenolindophenol (DCPIP). Effective hydrocarbon-degrading bacterial strains were identified in all analyzed areas, despite adverse environmental conditions. The highest bioremediation rates were achieved for gasoline (68%) in Alburrica, hexane (65%) in Algés, and toluene (79%) in Algés. Generally, the bacteria demonstrated efficient degradation of hydrocarbons added to the culture medium, with higher rates of aerobic biodegradation of hydrocarbons observed. These findings underscore the necessity for further in situ studies to better comprehend the relationship between native microbial communities and the potential for pollutant degradation in soil.

Keywords : biodegradability rate, hydrocarbonoclastic microorganisms, soil bioremediation, tagus estuary

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