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# Microbial Surfactants: A Biotechnological Solution for Soil and Water Remediation in the Danube Delta

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**Abstract:** The use of biosurfactants in environmental biotechnology represents a promising direction in modern strategies for the remediation of contaminated ecosystems. Data from the literature show that these biocompounds - particularly rhamnolipids, lipopeptides, surfactins, and sophorolipids - are widely used in the bioremediation of contaminated environments, facilitating the solubilization of hydrophobic pollutants and accelerating their biodegradation through microbial activity. Microbial strains, such as *Pseudomonas* spp., *Bacillus* spp., and *Candida* spp., have been extensively studied for their ability to biosynthesize surfactants that can contribute to the development of sustainable bioremediation solutions [1]. The Danube Delta, with its remarkable biodiversity, is exposed to anthropogenic pressures from agricultural, aquaculture, transportation, and tourism activities [2]. In this context, microbial biosurfactants can become key components in ecological remediation approaches, contributing to the reduction of persistent pollutants and the conservation of natural habitats. The integration of these solutions, based on renewable biological processes, aligns with circular economy and sustainable development objectives, being essential for environmental protection in the Danube Delta. In conclusion, biosurfactants produced through microbial synthesis offer a potential for application in green environmental remediation technologies, with direct relevance to the conservation and sustainability of ecosystems in this region.

**Keywords:** biosurfactants; bioremediation; Danube Delta; circular economy.



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