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Bioremediation for economical and ecological environmental decontamination

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The technology of bioremediation is emerging currently as one of the important alternatives for cleaning polluted environments. The development of technologies has increased the generation of waste and to overcome this environmental problem and global health threat, scientists are adopting biotechnological approaches for bioremediation. Bioremediation is a process of waste management that employs living organisms to remove harmful pollutants from the contaminated areas. Bioremediation is a technique that uses naturally occurring microbes for detoxifying hazardous substances but it is currently being improved with the utilisation of genetically modified microorganisms. The application of bioremediation is widely seen in contaminated soil and water. To eliminate contamination of persistent organic pollutants present in soil and water, employing bioremediation through microorganisms, mainly bacteria has been seen as an ecological and economical alternative approach to physicochemical processes. However, successful bioremediation requires bacteria that survive in the adverse environment and possess degradation ability. The bacteria that survive develop efficient adaptation mechanisms in the adverse environment and only the resistant bacteria that possess the appropriate enzymes for degradation play a major role in bioremediation technologies. Therefore, a study of the adaptation mechanisms and the degradation potential of resistant strains are considered important while selecting appropriate resistant bacterial strains for bioremediation application. Bioremediation has the potential to restore the contaminated environment but an investigation of a wide diversity of microbes with detoxification abilities is required for achieving successful environment decontamination. This understanding might help in the preservation of the long-term sustainability of natural terrestrial and marine ecosystems.

Keywords: Bioremediation, Microorganisms, Bacteria in bioremediation, Biotechnological approach, Degradation, Organic pollutants, Decontamination

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