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Bioremediation

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Introduction

Pollutants degradation can be achieved through many physical, chemical, and biological methods. Using biological agents especially microorganisms to achieve this is called bioremediation. So, there are a process catalyzed by a living organism, especially microorganism, (biodegradation) and a specific technology to exploit this process in application (biotechnology). Basics of microbial degradation provide us examples and advances which need well planning strategies to translate the knowledge into acceptable levels of application in different fields related to pollutants degradation and elimination to keep safe environment.

Environmental Biotechnology

Our environment is now polluted by various types of molecules, both natural and man-made [1]. The microbiological science of biodegradation provides a foundation for the biotechnology of environmental cleanup; bioremediation [2]. Millions of natural and synthetic organic chemical substances are present in both soil and aquatic environments. Toxicity and/or persistence determine the polluting principle of these substances. The biological responses to these pollutants include accumulation and degradation [3].

Bioremediation

Bioremediation is a managed process in which biological (especially microbiological) catalysis acts on pollutants and thereby remedies or eliminates environmental contamination. Actually, natural and genetically modified organisms, including microbes (mainly bacteria, but also protozoa, fungi, and algae and even viruses), flora (i.e. large plants), and fauna (e.g. earthworms) degrade pollutants into simpler, less toxic forms. Pollutants degradation using biological agents especially microorganisms is called bioremediation which exploits biodegradation basis in practice. These include some basic understanding for biotechnological and microbiological basis of pollutants degradation through a series of concepts:

i. View origins and major sources of pollutants and behavior of organic compounds in the environment.

ii. View microbiological basis of biodegradation since microorganisms are the main degraders in the environment.

iii. View the different aspects of bioremediation as an effective biotechnology help to sustain the environment. Characteristic aspects included biochemodynamics of bioremediation, different bioremediation technologies; such as biostimulation, bioaugmentation and phytoremediation and techniques; both *in situ* and *ex situ* treatment methods.

iv. View plant–bacteria partnerships in remediation of soil and water polluted with hydrocarbons and study role of enzymes involved in biodegradation of toxic organic pollutants especially aromatic hydrocarbons.

v. View recent advances and applications in this field using biodegradation databases and projects to best link between biodegradation and bioremediation.

Conclusion

Bioremediation is an alternative to traditional physicochemical techniques for the remediation of organic pollutants at contaminated sites. Microorganisms with suitable and stable genetic traits, and efficient and effective biodegradation processes would be helpful for clean and green environment.

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