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A Scientific Review on Bioremediation

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Editorial

Bioremediation is a metabolic process that uses biological organisms to remove or neutralise an environmental pollution. Microscopic organisms such as fungi, algae, and bacteria are included in the “biological” species, as is the “remediation”—the treatment of the condition. Phytoremediation, bioventing, bioattenuation, biosparging, composting (biopiles and windrows), and landfarming are some examples of bioremediation-related technologies. Microbial bioremediation, phytoremediation, and mycoremediation are some of the most frequent types of bioremediation. Bioremediation is a field of biotechnology that involves the removal of contaminants, pollutants, and toxins from soil, water, and other environments using living organisms such as microorganisms and bacteria. Microbes are currently used in 'bioremediation' methods to clean up pollution treatment. Microorganisms are used in bioremediation to minimise pollution by biologically degrading contaminants into non-toxic compounds.

Bioremediators are biological agents that are used in the bioremediation of polluted sites. Bacteria, archaea, and fungi are some of the most common bioremediators. Enzymes found in microbes detoxify these hazardous chemicals. The majority of bioremediation processes involve oxidation-reduction reactions, in which an electron acceptor (usually oxygen) is added to stimulate the oxidation of a reduced pollutant (e.g. hydrocarbons) or an electron donor (usually an organic substrate) is added to reduce oxidised pollutants (nitrate, perchlorate, oxidised methane). Bioremediation is a technique for reducing the impact of anthropogenic byproducts such as those produced by industrialization and agricultural processes. Bioremediation is often less expensive and more long-lasting than other cleanup options.

Thermal desorption, vitrification, air stripping, bioleaching, rhizofiltration, and soil washing are some of the other remedial procedures. Bioremediation, or biological treatment, is a comparable technique to treating wastes such as wastewater, industrial waste, and solid waste. Bioremediation's ultimate purpose is to remove or minimise hazardous substances in order to improve soil and water quality. Contaminants can be eliminated or decreased using a variety of in-situ and ex-situ bioremediation procedures. Bioremediation techniques are classed according to where they are used. Non-destructive and cost-effective in-situ treatments treat contaminated environments. Ex-situ treatments, on the other hand, frequently necessitate the excavation of the polluted site, which raises expenditures. Additional nutrients, vitamins, minerals, and pH buffers may be added to both of these ways to improve the microbes' circumstances. Biostimulation (the addition of specialised microbial cultures to accelerate biodegradation) is sometimes used. Phytoremediation, bioventing, bioattenuation, biosparging, and composting (biopiles and windrows) are some examples of bioremediation-related methods.