



## Microbes and Microbial Biotechnology for Green Remediation

2022, Pages 13-27

### Chapter 2 - Bioremediation of soil: an overview

Mehjabeen<sup>1</sup>, Anoop Kumar Devedee<sup>2, 5</sup>, Monalisa Sahod<sup>2, 3</sup>, Kartikeya Choudhary<sup>2, 4</sup>, Mahendra Singh<sup>1</sup>, Ghanshyam<sup>1</sup>

<sup>1</sup> Department of Soil Science and Agricultural Chemistry, Bihar Agricultural University, Sabour, Bihar, India

<sup>2</sup> Department of Agronomy, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh, India

<sup>3</sup> Centurion University of Technology and Management, Odisha, India

<sup>4</sup> MS Swaminathan School of Agriculture, Shoolini University of Biotechnology and Management Sciences, Solan, Himachal Pradesh, India

<sup>5</sup> Department of Agronomy, Faculty of Agriculture and Natural Science, Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, Uttar Pradesh, India

Available online 24 June 2022, Version of Record 24 June 2022.

Show less ^

Outline | Share | Cite

<https://doi.org/10.1016/B978-0-323-90452-0.00033-5>

[Get rights and content](#)

#### Abstract

Soil pollution is a major and growing concern all over the globe and a serious threat to the environment as well as to living organisms. Different pollutants, viz. heavy metals, radionuclides, organic pollutants, plastics, agrochemicals like pesticides, herbicides, etc. are known to pollute the soil and reduce the already limited arable land important for food production. In search of economical and eco-friendly remediation techniques many methodologies have been devised, such as rhizoremediation and phytoremediation, and by using them polluted lands can be put back in cultivation or other types of production systems without harming the environment any further. Bioremediation is one such technique in which microorganisms are employed for the purpose directly or indirectly. Bioremediation means the use of biological agents to detoxify and degrade environmental contaminants. Using microorganisms for remediation reduces time and labor by a variety of mechanisms. They help in bioremediation via various mechanisms such as biosorption, EPS production, metalloproteins, metal resistant genes, SOD, POD, Catalase production, volatilization, and siderophore production. Some of the microbial strains used for bioremediation are *Pseudomonas*, *Rhizobium*, *Klebsiella*, *Bacillus*, *Enterobacter*, and others. Microbial inoculation decreases the MDA (malondialdehyde) and H<sub>2</sub>O<sub>2</sub> content by 20% and 33%, respectively. They also increase the antioxidant enzymes such as SOD (superoxide dismutase enzyme) and catalase by 30% and 7%, respectively. They can also biotransform the oxidation states of toxic metals to nontoxic ones. They even enhance the hyperaccumulator capacity to aid phytoremediation.

[<](#) Previous

Next [>](#)

#### Keywords

Bioremediation; heavy metals; biosorption; SOD; *Pseudomonas*

[Recommended articles](#)