Environmental Science and Engineering

Aravind Jeyaseelan
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Sustainable and Cleaner Technologies for Environmental Remediation

Avenues in Nano and Biotechnology

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Chapter 2
Biological and Eco-Friendly Cost-Effective Measure for Remediation

Anil Kumar Moola, Selvam Sathish, S Mari Selvam, Balasubramanian Paramasivan, Sujatha Peela, Harish Kumar Seenivasan, and Dhandapani Gurusamy

Abstract The natural environment is being spoiled with harmful chemicals from tannery effluent, industrial effluent, and domestic wastewater by human uses. Therefore, the avoidance of pollution and the degradation of harmful chemical compounds are essential for the future mankind. Several microorganisms are involved in the biodegradation of harmful contaminants in the soil including bacteria, fungi, and algal species. Phytoremediation is the best choice for many developing and developed nations to as it is an eco-friendly process for the decontamination of several environmental pollutants. Green plants absorb the wastes materials in the soil through their roots. Nowadays, *in-vitro* studies on the phytoremediation of emerging pollutants are giving better results. This chapter focuses on the recent studies on phytoremediation through various roots, including hairy roots, adventitious roots, and normal roots. It also reports the mechanism of biodegradation and enzymatic reactions that

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GENOMICS OF PLANT–PATHOGEN INTERACTION AND THE STRESS RESPONSE

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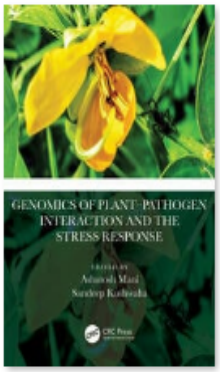

Chapter

Omics Technologies Unravelling the Plant–Pathogen Interaction and Stress Response

By Sakthi Ambothi Rathnasamy, Sellamuthu Gothandapani, Selvi Chellamuthu, Amrita Chakraborty, Dhandapani Gurusamy, Amit Roy

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ABSTRACT

Plants are associated with microbial communities in their natural environments, causing biotic stress or mutual benefit. Understanding plant defence responses to biotic stresses is fundamental for developing resistant crop varieties to increase productivity. However, ongoing climate change has resulted in emerging plant diseases, unpredictably influencing existing beneficial microbial relationships. Plants respond to pathogen attacks through extracellular and intracellular immune receptors decoding pathogen-associated molecular patterns and pathogen-derived effectors. Understanding plant–pathogen interaction using a multi-omics approach facilitates the generation of resistant crop varieties against biotic stress in a shorter amount of time. The multi-omics approach gathers DNA, RNA, protein, and metabolome level information that leads to better understanding of the molecular underpinnings of plant–pathogen interaction. This chapter discusses the advancement of omics methodologies in exploring complex metabolic networks and regulatory mechanisms during plant–pathogen interaction. Omics technologies can also help understand the beneficial endophytic and epiphytic microbial communities and their interaction with the host in different environmental conditions. Furthermore, genome- and transcriptome- level analysis of plants after pathogen attack facilitates the identification of defence mechanisms and resistance genes. Hence, sustainable agricultural productions in the future heavily rely on omics methodologies.

ENVIRONMENTAL CONTAMINANTS

Impact, Assessment, and Remediation

Pritam Ganguly
Jajati Mandal
Mariappan Paramasivam
Sandip Patra
Editors

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CHAPTER 9

Methods of Trace Analysis for Persistent Pollutants

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ABSTRACT

Persistent organic pollutants (POPs) are chemical substances that have drawn considerable international attention over the past several decades; as they possess the capacity to travel wide, their residues continue to persist for a long time in the environment and accumulate in ecosystems. The principal sources of POPs are agricultural practices, industries, and sewage wastes. The importance of monitoring the distribution of POPs in different food and environmental matrices using modern analytical techniques is highly

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