

Pallaval Veera Bramhachari *Editor*

# Understanding the Microbiome Interactions in Agriculture and the Environment

 Springer



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# Table of contents (16 chapters)

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## Front Matter

[Download chapter PDF](#) 

Pages i–xxiii

---

## **Unravelling the Microbiome Interactions in the Environment and Agriculture in the Era of Metagenomics**

Pallaval Veera Bramhachari

Pages 1–9

---

## **Antimicrobial Resistance in Environmental Microbiome: An Overview**

Lalrokimi, Yogesh Malvi, Bhim Pratap Singh, Zothanpuia

Pages 11–22

---

## **Mechanistic Adaptation of Microbiomes in Extreme Environments**

K. Viswadeepika, Pallaval Veera Bramhachari

Pages 23–44

---

## **Mangrove Microbiomes: Biodiversity, Ecological Significance, and Potential Role in the Amelioration of Metal Stress**

Chanda V. Berde, Asha Giriyan, Vikrant B. Berde, Pallaval Veera Bramhachari

Pages 45–62

---

## **Dynamics of the Coral Microbiome and Its Link to Climate Change**

Yaser A. Arafath, Aifa S. Fathima, Saqib Hassan, Ramu Meenatchi, Anushara Prabhakaran, Pallaval Veera Bramhachari et al.

Pages 63–82

---

## **A Paradigm Shift in the Role of the Microbiomes in Environmental Health and Agriculture Sustainability**

Emmanuel Atiatorme, Pallaval Veera Bramhachari, Ekamber Kariali, Pola Sudhakar

Pages 83–101

---

## **Modifications in Environmental Microbiome and the Evolution of Viruses Through Genetic Diversity**

Pola Sudhakar, Dhanalakshmi Padi

Pages 103–112

---

## **The Cellulosome: A Fiber-Degrading Strategist of the Rumen Microbiome**

Srijana Mukkala, Pallaval Veera Bramhachari, Y. Harish Kumar Reddy

Pages 215–241

---

## **Metagenomic Approaches for Studying Plant–Microbe Interactions**

S. Murali Mohan, Pola Sudhakar

Pages 243–254

---

## **Nitty-Gritty into the Plant Microbiomes: Understanding Microbial Niche Associations and Dynamics in Various Plant Parts**

Gandham Sandeep Kumar, Sholapuri Payani, Pallaval Veera Bramhachari, G. V. Swarnalatha

Pages 255–269

---

## **A Conceptual Framework to Explore the Functional Implications of Coral-Associated Microbiomes and Their Role in Promoting Plant Growth**

P. S. Seethalakshmi, Saqib Hassan, Junaaid Ahmad Malik, Pallaval Veera Bramhachari, George Seghal Kiran, Joseph Selvin

Pages 271–284

---

## **Soil Microbiome: Characteristics, Impact of Climate Change and Resilience**

Anushara Prabhakaran, Ramu Meenatchi, Surajit Pal, Saqib Hassan, Pallaval Veera Bramhachari, George Seghal Kiran et al.

Pages 285–313

---

## **Rhizobacteriome: Plant Growth-Promoting Traits and Its Functional Mechanism in Plant Growth, Development, and Defenses**

Reema Prakash, Ramesh Subramani, Krodi, Anusha, Chanda Vikrant Berde, Thummala Chandrasekhar et al.

Pages 315–344

# Rhizobacteriome: Plant Growth–Promoting Traits and Its Functional Mechanism in Plant Growth, Development, and Defenses

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pp 315–344 | [Cite this chapter](#)

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## Abstract

The rhizomicrobiome comprises a wide variety of microorganisms that are essential for microbial colonization and root development in a wide variety of plants. A plant's growth, development, and defense mechanisms would be impossible without the rhizomicrobiome's microbes. In order to develop and operate properly, roots are essential to plants because they give structural support and aid in the intake of water and nutrients. This rhizobacteriome, a diverse bacterial population with particular roles that affect plant health, may be found in plant root exudates due to the complex variety of elements present. There are several metabolites produced by the plant-growth-promoting rhizobacteria (PGPR) in the rhizosphere near the plant roots that stimulate the plant's development. Many PGPRs have the ability to solubilize phosphate, fix N<sub>2</sub>, produce biosynthesis of hydrolytic enzymes (hydrolase), produce phytohormones (phytoestrogens), produce siderophores (antibiotics), and more. Climate change, population growth, and the use of herbicides and insecticides have all had a significant influence on crop productivity in recent decades. Studies show that PGPR can boost plant growth and yield in a variety of species. As a result, PGPR dynamic microorganisms can be used as biofertilizers or biopesticides in agricultural techniques, which is critical to alleviating the urgent call for sustainable production. Rhizobacteriome, in particular PGPR found in the rhizosphere, and their many strategies for enhancing plant production are summarized in this chapter.