Pallaval Veera Bramhachari *Editor*

Understanding the Microbiome Interactions in Agriculture and the Environment

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

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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 N2, 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.