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Bacterial Endophytes for Sustainable Agriculture and Environmental Management

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Abstract

Similar to human microbiome, plants are also colonized by a large number of tiny microorganisms. Plant endophytic bacteria colonize the internal tissues of plants without causing apparent diseases or showing any symptoms to their host. Endophytes that constitute the plant endobiome serve various functions from plant growth promotion and stress tolerance to the modulation of the plant's chemistry. Medicinal plants are the inherent source for the production of a large number of bioactive phytochemicals, but with recent understanding on plant-microbe interactions, it has been observed that a significant number of these metabolites result from the contribution of associated microbial partners. Therefore, endophytes, particularly from medicinal plants whose microbiome remains largely unknown, have extended immense interest of scientific community in terms of bio-prospection for bioactive metabolites such as novel antimicrobial compounds, pharmacologically relevant drugs, and enzymes with novel properties. Majority of these bacterial endophytes producing bioactive metabolites belong to the Gram positive, high G + C, actinobacteria. For instance, endophytic *Streptomyces* spp. produce numerous novel antibiotics active against multi-drug-resistant bacteria. This chapter gives a comprehensive summary of the diversity of endophytic bacteria that colonize the internal tissues of various medicinal plants and their prospection for bioactive compounds. The chapter also describes the role of such compounds in agriculture, food, environment, and medicines. Possible future aspects of plant microbiome study in context to

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