



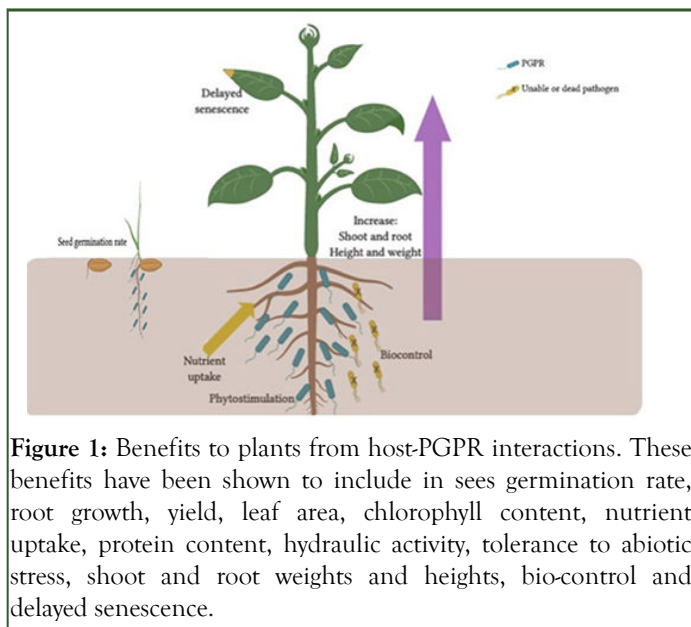
Association of Microbial Community for Commercialization of PGPR Technology

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CASE DESCRIPTION

Microbes of the phytomicrobiome are associated with every plant tissue and in combination with the plant form the holobiont. Plants regulate the composition and activity of their associated bacterial community carefully. These microbes provide a wide range of services and benefits to the plant; in return, the plant provides the microbial community with reduced carbon and other metabolites (Figure 1) [1].



Soils are generally a moist environment, rich in reduced carbon which supports extensive soil microbial communities. The rhizomicrobiome is of great importance to agriculture owing to the rich diversity of root exudates and plant cell debris that attract diverse and unique patterns of microbial colonization. Microbes of the rhizomicrobiome play key roles in nutrient acquisition and assimilation, improved soil texture, secreting and modulating extracellular molecules such as hormones, secondary metabolites, antibiotics and various signal compounds, all leading to enhancement of plant growth. The microbes and

compounds they secrete constitute valuable biostimulants and play pivotal roles in modulating plant stress responses [2].

Research has demonstrated that inoculating plants with Plant-Growth Promoting Rhizobacteria (PGPR) or treating plants with microbe-to-plant signal compounds can be an effective strategy to stimulate crop growth. Furthermore, these strategies can improve crop tolerance for the abiotic stresses (e.g., drought, heat and salinity) likely to become more frequent as climate change conditions continue to develop. This discovery has resulted in multifunctional PGPR-based (Figure 2) [3].

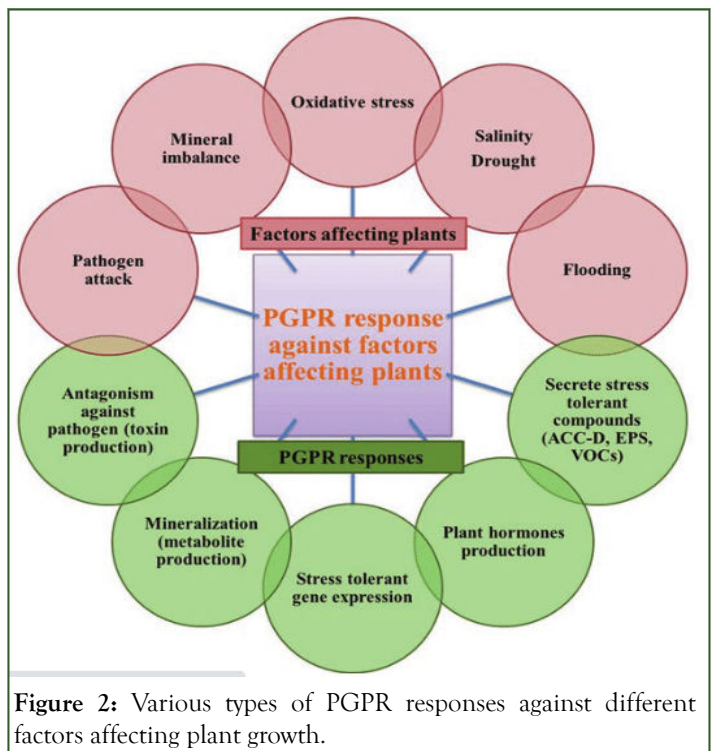


Figure 2: Various types of PGPR responses against different factors affecting plant growth.

Formulations for commercial agriculture, to minimize the use of synthetic fertilizers and agrochemicals. This review is an update about the role of PGPR in agriculture, from their collection to commercialization as low-cost commercial agricultural inputs.

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Received: 07-Feb-2023, Manuscript No. JPPM-23-19807; **Editor assigned:** 10-Feb-2023, PreQC No. JPPM-23-19807 (PQ); **Reviewed:** 24-Feb-2023, QC No. JPPM-23-19807; **Revised:** 31-Mar-2023, Manuscript No. JPPM-23-19807 (R); **Published:** 28-Apr-2023, DOI: 10.35248/2157-7471.23.14.664

Citation: Palanisamy S (2023) Association of Microbial Community for Commercialization of PGPR Technology. J Plant Pathol Microbiol. 14:664.

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First, we introduce the concept and role of the phytomicrobiome and the agricultural context underlying food security in the 21st century. Next, mechanisms of plant growth promotion by PGPR are discussed, including signal exchange between plant roots and PGPR and how these relationships modulate plant abiotic stress responses via induced systemic resistance. On the application side, strategies are discussed to improve rhizosphere colonization by PGPR inoculants. The final sections of the paper describe the applications of PGPR in 21st century agriculture and the roadmap to commercialization of a PGPR-based technology [4].

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