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Editorial

Plant Growth Promoting Rhizobacteria (PGPR) as an Alternative Stratify for Plant Stress Tolerance

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The plants are affected by biotic and abiotic stresses which reduced the yield and quality of seeds. The environmental stresses change the physical, biochemical and molecular factors that adversely affected the plants' growth and development. The usage of chemical fertilizers and pesticides in agriculture degraded the soil quality and fertility. Therefore, it is a need of an hour to formulate safer and sustainable agricultural practices. Plant growth promoting rhizobacteria (PGPR) are treasurable bacteria that colonize plant roots and improve the plant growth by a wide variety of mechanisms [1]. It provides an economically mesmerising sound ways for defending plants against stress condition. PGPR may promote plant growth by regulating plant hormones, nutrient fixation for easy uptake by plant, production of siderophore, volatile organic compounds and protection enzyme [2].

PGPRs belong to a number of different bacterial families, including *Rhizobium, Bacillus, Pseudomonas, Burkholderia*, etc. PGPRs can improve the growth of many plants under abiotic stress conditions [3] and might therefore open new attractive strategy for a sustainable agriculture. A first Timmusk and Wagner [4] found the capability of *Paenibacillus polymyxa* to reduce the effect of drought stress in *Arabidopsis thaliana*. Following that discovery, many scientists have studied the ability of PGPR to stimulate the plant stress tolerance [5]. The application of *Rhizobium* and *Pseudomonas* to *Zea mays* enhanced the salt tolerance ability [6]. They induce the plant growth directly by supplementing nutrients such as phosphorus and nitrogen to the plants by nitrogen fixation and phosphate solubilisation in the soil [7]. Some microorganisms produce plant hormones, such as indole acetic acid and gibberellic acid, which induce increased root growth and thereby lead to enhanced uptake of nutrients [8].

Plants have the ability to acquire a state of induced systemic resistance (ISR) to pathogens after inoculation with PGPRs [9]. Several plant pathogens were controlled by applying PGPRs. In association with plant roots, PGPRs can prime the plant innate immune system and confer resistance to a broad spectrum of pathogens with a minimal impact on yield and growth [9]. Several PGPRs, including *Azospirillum brasilense, Acineto bacterlwoffii, Bacillus pumilus, Chryseobacterium balustinum, Paenibacillus alvei, Pseudomonas fluorescens, Pseudomonas putida* and *Serratia marcescens* colonize roots and protect on a large variety of plant species, including vegetables, crops, and even trees, against foliar diseases in greenhouse and field trials [11]. Therefore, PGPR can be used as an environmentally friendly, cost effective and economical tool for enhancing the growth and tolerating the stresses in plants.

Bibliography

1. Nadeem SM., *et al*. "Rhizosphere Bacteria for Crop Production and Improvement of Stress Tolerance: Mechanisms of Action, Applications, and Future Prospects. In: Arora N. (eds) Plant Microbes Symbiosis: Applied Facets". *Springer*, New Delhi (2015): 1-36.
2. Choudhary., *et al*. "Biotechnological perspectives of microbes in agro-ecosystems". *Biotechnology Letter* 33 (2011): 1905-1910.
3. Yang J., *et al*. "Rhizosphere bacteria help plants tolerate abiotic stress". *Trends Plant Science* 14.1 (2009): 1-4.
4. Timmusk S and Wagner EGH. "The Plant-Growth-Promoting Rhizobacterium Paenibacillus polymyxa Induces Changes in Arabidopsis thaliana Gene Expression: A Possible Connection Between Biotic and Abiotic Stress Responses". *Molecular Plant Microbe Interactions* 12.11 (1999): 951-959.

5. Rejeb I., *et al*. "Plant Responses to Simultaneous Biotic and Abiotic Stress: Molecular Mechanisms". *Plants* 3.4 (2014): 458-475.

6. Bano A and Fatima M. "Salt tolerance in Zea mays (L.) following inoculation with Rhizobium and Pseudomonas". *Biology and Fertility of Soils* 45 (2009): 405-413.

7. Omar MNA., *et al*. "Improvement of Salt Tolerance Mechanisms of Barley Cultivated Under Salt Stress Using Azospirillum brasilense". In: Ashraf M, Ozturk M and Athar HR (eds) Salinity and Water Stress. (Tasks for Vegetation Sciences, 44) Springer Netherlands (2009): 133-147.

8. Berg G. "Plant-microbe interactions promoting plant growth and health: perspectives for controlled use of microorganisms in agriculture". *Applied Microbiology Biotechnol*ogy 84.1 (2009): 11-18.

9. Arya B., *et al*. "PGPR Induced Systemic Tolerance in Plant". *International Journal of Current Microbiology and Applied Sciences* 7 (2018): 453-462.

10. Van Hulten M., *et al*. "Costs and benefits of priming for defense in Arabidopsis". *Proceedings of the National Academy of Sciences of the United States of America* 103 (2006): 5602-5607.

11. Van Loon LC. "Plant responses to plant growth-promoting rhizobacteria". *European Journal Plant Pathology* 119 (2007): 243-254.

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