

PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR): WHAT AND WHY?

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ABSTRACT

With increased population, shrinking available resources, and climate change sustaining agricultural productivity becomes challenging. Integrating PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR) in management practices may help largely in agriculture by reducing the dependency on chemical fertilizers and chemicals. The PGPR is a green technology that can help enhance soil fertility by improving nutrient availability, crop growth and development. PGPR also contributes to phytoremediation and imparts resistance to crop plants against disease and pest attacks.



INTRODUCTION

With globalization and rising awareness about food quality, the emphasis is increasing on higher agricultural productivity with quality. However, on the other hand, increased population, shrinking available resources, and climate change sustaining agricultural productivity becomes challenging. Therefore, in the last decades, the focus has shifted to saving the available resources for future generations. In this context, researchers are trying to understand and emphasize the role of plant growth in promoting rhizobacteria for higher production and sustainability.

PLANT GROWTH PROMOTING RHIZOBACTERIA?

PGPR are the bacterial strains that colonize the rhizospheric root zone of plants and contribute to plant growth and development through increasing nutrient availability through biological nitrogen fixation and solubilization, releasing phytohormones, decomposing soil organic matter, imparting resistance against diseases and pest attacks. PGPR follow several mechanisms for promoting plant growth and development, including biological nitrogen fixation, nutrient solubilization, production of phytohormones, antibiotic and siderophores production, production of growth hormones, etc.

POTENTIAL ROLE IN AGRICULTURE

The effective utilization of PGPR in agriculture has immense scope for increasing global food production, such as:

- ❖ By biological nitrogen fixation, PGPR improves nitrogen availability in the soil.
- ❖ Through solubilization, PGPR improves the phosphorus and potassium in the soil.
- ❖ Enhanced activity of PGPR contributes to soil organic matter decomposition and release of micronutrients in soil solution.
- ❖ The PGPR strains help nodulate and improve the crop plants' root system.
- ❖ PGPR release certain growth hormones viz; IAA, cytokinin and gibberellin, which are beneficial for plant growth and development.
- ❖ PGPR releases substances acting as antibiotics and imparts resistance against pest and disease attacks on crop plants.
- ❖ Removal of heavy metals through rhizoremediation.

AVAILABILITY IN MARKET

Earlier, the availability of PGPR was limited in the market, but due to government support and increased participation from the private sector, the availability has been increased. Different formulations of PGPR are now available at fertilizer and pesticide stores at a minimal charge. These formulations are solid and liquid carriers based and can be effectively used for seed treatment, root dipping, spraying, and soil application without any harmful effects.

PRECAUTION BEFORE USING PGPR

- ❖ The PGPR formulation purchased must have certification from the manufacturer about its expiry and viable population of bacteria.
- ❖ Each crop has specific PGPR strains, so only recommended strains should be used.
- ❖ A little excess amount of the culture should be used to maintain the microbial population's density and quick colonization.
- ❖ The PGPR products should not be exposed to a high temperature beyond 28°C as it will reduce the viability of the microorganism.
- ❖ The farm implements used for other agrochemicals must be cleaned properly before using PGPR. If possible direct contact should be avoided.

CONCLUSION

An appropriate management strategy for crop cultivation is the key to improving the crop productivity and nutritional quality of the food. The integration of PGPR in management practices may help largely in the agriculture sector by reducing the dependency on chemical fertilizers and chemicals. The PGPR is a green technology that can help enhance soil fertility by improving nutrient availability, crop growth and development. PGPR also contributes to phytoremediation and imparts resistance to crop plants against disease and pest attacks.
