

Plant growth-promoting bacteria

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Considering the current growing population of the world, improved food production has become a serious necessity. Although agricultural food production is thriving efficiently, the management of this sector under stressful conditions is a real task. Plants face a number of threats, such as varying climate temperatures, threats from animals, over-usage of resources by humans and poor quality of soil due to over-usage. Researchers have found a way by introducing fertilisers and pesticides; however, all these come under the cost of environmental instability. Therefore, considering these conditions, the development of new ways of sustainable food production is a necessity. Microorganisms and plants have a great partnership where the bacteria improves the quality of the soil. Many useful microbes are available in nature, and they can be used as biocontrol agents, soil-enhancing fertilisers, pathogen control agents and in many other forms. These useful microbes can be used as a replacement for harsh chemicals that affect the environment. Further, the plant growth-promoting bacteria have shown some positive effects like root development, degradation of soil pollutants, better nutrient availability to the plant, antibiosis by production of lytic enzymes, production of growth-promoting enzymes and the suppression of harsh chemicals. For example, *Pseudomonas fluorescens* BSP53a helps in revitalising root development in black currant cuttings. Plant growth-promoting bacteria mainly concentrate on promoting the development of plants in every possible aspect. In addition, there are many symbiotic relationships in nature, such as *Rhizobia* and *Frankia*. Considering all these aspects, the plant growth-promoting bacteria, such as *Agrobacterium radiobacter*, *Bacillus pumilus*, *Pseudomonas* spp., etc., are commercialised for various purposes. Furthermore, plant growth-promoting bacteria also help in maintaining a better ecological balance in the environment, which shows a growing possibility for the development of organic agriculture methods. Additionally, these bacteria can also be used in phytoremediation strategies. Thus, the common misconception that bacteria are only disease-causing organisms can be erased. Further, people can also be educated that the bacteria can be customised accordingly for reducing stress on crops, hence improving their yield.

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