Plant growth-promoting bacteria

Mudigonda Likitha Raj

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.

Keywords: Plant growth-promoting bacteria, Pathogens, Biocontrol agents, Agriculture, Organic agriculture, Stress management

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