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Microbial Biotechnologies in Sustainable Agriculture

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ABSTRACT

Extensive use of agrochemicals and trend in climatic changes have greatly influenced agro-ecosystems and crop failures throughout the world. The ecological and economic problems of today's agriculture have re-invigorated the idea of using natural rhizosphere microbial population in order to reduce the application of costly and environmentally-polluting agrochemicals to a minimum and alleviation abiotic and biotic stress in agricultural crops. Plant beneficial microbial resources promise to replace and/or supplement many such destructive, high intensity practices and support ecofriendly crop production. Plant growth promoting bacteria (PGPB) may promote plant growth directly through the processes such as by fixation of atmospheric nitrogen, solubilization of phosphorous, production of siderophores that solubilize and sequester iron, or production of plant growth regulators (hormones), lytic enzymes and hydrogen cyanide. Some bacteria support plant growth indirectly, by improving and/or eliminating the growth-restricting conditions either via production of antagonistic substances or by inducing resistance against plant pathogens and through competition for nutrients and space can improve significantly plant health and promote growth, as evidenced by increases in seedling emergence, vigor, and yield. Thus, application of microbial biotechnologies in crop production has ecological, environmental, and social benefits. It plays a crucial role as integral component of sustainable development.

Keywords: PGPB, agrochemicals, abiotic stress, biotic stress, biocontrol, crop yield

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