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Aloo, Becky

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The potential of Bacilli rhizobacteria for sustainable crop production and environmental sustainability

B. N. Aloo, B. A. Makumba, E.R.Mbega

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Abstract

Conventional agricultural practices often rely on synthetic fertilizers and pesticides which have immense and adverse effects on humans, animals and environments. To minimize these effects, scientists world over are now deeply engaged in finding alternative approaches for crop production which are less dependent on chemical inputs. One such approach is the use of rhizospheric bacteria as vital components of soil fertility and plant growth promotion (PGP) through their direct and indirect processes in plant rhizospheres. Among the most studied rhizobacteria are the Bacilli, particularly for production of antibiotics, enzymes and siderophores all of which are important aspects of PGP. Despite this, little information is available especially on their potentiality in crop production and their direct application only involves a few species, leaving a majority of these important rhizobacteria unexploited. This paper gives an overview of the unique properties of Bacilli rhizobacteria as well as their different PGP mechanisms that if mined can lead to their successful application and agricultural sustainability. It further points out the missing aspects with regards to these important rhizobacteria that should be considered for future research. This information will be useful in analyzing the PGP abilities of Bacilli rhizobacteria with an aim of fully mining their potential for crop production and environmental sustainability.

Keywords

Bacillus; Soil fertility; Sustainable agriculture; Plant growth promoting rhizobacteria (PGPR)