Exploration of Plant Growth-Promoting Actinomycetes for Biofortification of Mineral Nutrients

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Abstract

Mineral malnutrition, especially Fe and Zn, affects more than two million people around the world and increases vulnerability to illness and infections. These malnourished people live in developing countries and rely upon staple foods routinely with inability to either afford for dietary diversification or pharmaceutical supplementation or industrial fortification of minerals. Biofortification is a strategy that can tackle hidden hunger merely through staple foods that people eat every day. This strategy can be achieved through agronomic practices and conventional breeding and genetic engineering approaches, and each has their own pros and cons. The sustainability of such grain fortification with higher seed mineral concentration is soil health dependent, especially on the availability of mineral in the rhizosphere. Microorganisms, the invisible engineers in improving the soil health by solubilizing trace elements and by driving various biogeochemical cycles of soil, have the ability to serve as a key solution for this complex issue. In specific, plant growth-promoting (PGP) microbes reside in root-soil interface and employ the use of siderophores, organic acids, and exopolysaccharides for increasing the mineral availability and subsequent mobilization to the plants. Increasing the seed mineral density with the use of such PGP microbes, especially actinomycetes, is in its infancy. Hence, this chapter is aimed to bring a view on the role of microbes, especially actinomycetes, with metal-mobilizing and PGP traits for biofortification as this strategy may act as a complementary sustainable tool for the existing biofortification strategies.

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