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Commentary

The Role of Microbial Biofortification in Plant Pathology and Promoting Soil Nutrient Status for Plant Growth

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DESCRIPTION

In order to boost the bio economy, modern agriculture focuses on increasing crop yield by using bacteria that can oxidase zinc to produce crops that are enriched with zinc. A lack of zinc in the soil inhibits plant growth and decreases zinc uptake in the edible parts of plants. Consequently, the biofortification strategy can enhance the amount of zinc in plants' edible sections. The bulk of biofortification techniques, take a lot of time and require substantial involvement in daily activities. Therefore, the microbial biofortification technique may aid in boosting zinc levels in plants and enhancing crop quality, which would ultimately result in more environmentally friendly crop production. As a result, using microbes to increase zinc content in plants and improve crop quality may be useful, providing an overview of the role of microorganisms for a greener strategy.

Therefore, the use of microbes may be advantageous for increasing zinc content in plants and improving crop quality, offering a summary of the function of microorganisms for a greener strategy. In addition, using bacteria that can dissolve zinc as a potential biosource is an economical alternative biofortification method like; Resistance, destroying biodiversity, causing deforestation, and causing excessive groundwater extraction, Therefore, meeting the demand for high-quality food for everyone is going to become increasingly difficult in the next years due to the unpredictable and abrupt changes in the environment and the rising levels of agricultural pollution. These issues drove researchers to look for alternatives that could significantly reduce the use of synthetic farm chemicals and advance agricultural methods based on resource management on-farm, natural harmony within living soil communities, and coexistence among interacting species in soil, water, and the environment.

The term "Plant Growth-Promoting Rhizobacteria" (PGPR) refers to a large group of soil bacteria that, when cultured alongside a host plant, stimulate plant development. In order to boost the availability and uptake of mineral nutrients for plants through a variety of methods, biofertilizer refers to the employment of soil microbes. Through a variety of biological activities, such as fixing atmospheric nitrogen (N), solubilizing phosphorus (P), and silicon, PGPR can transform mineral nutrients from inaccessible to plant-useable forms (Si). These bacteria are widely distributed in a variety of habitats, including soil, water, and sediments.

The term "holobiome" refers to a complex network of symbiotic relationships between an individual plant and its associated microbiome. A growing body of research suggests that symbiotic plant root colonisers can increase crop productivity by promoting plant growth through the production of phytohormones and siderophores, increasing plant resistance to biotic and abiotic stresses, and enhancing plant performance at the cellular, biochemical, and molecular levels. microbial relationships, Such interactions increase the surface area that plant roots cover, fix nitrogen in the soil, and promote nutrient intake for improved plant growth.

In order to understand the varied impacts of microbial inoculants on a promising hybrid and its parent inbred lines in terms of soil-plant properties, such as soil macro- and micronutrients, plant development, metabolic activities, and Fe/Zn content in grains, the current study was carried out. The genotypes being assessed include Pusa Vivek QPM 9 Improved, the first multi-nutrient rich hybrid in the world, which is a single cross quality protein maize hybrid that is high in lysine and tryptophan as well as Provitamin A. The hybrid's and its parents' responses to microbial inoculation were studied, including those of Pusa Maize Inbred ProVitamin 1 and Pusa Maize Inbred ProVitamin 2. The underlying theory being tested was that biofilms containing combinations of promising microorganisms that are known for their efforts to mobilise nutrients would perform better than their partners; however, differential responses may be seen in the response of parent inbred lines and hybrid for selected traits as a result of microbial inoculation. Exploring plant-microbe interactions, which are known to play a critical role in enhancing the nutritional status of soil and enriching micronutrients through metal solubilization,

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mobilization, and translocation to various sections of the plant, is a little studied but promising strategy In order to increase the accumulation of micronutrients in the grains of main cereal crops, microbes can be utilized; this has proved successful with rice and wheat. Its potential must still be investigated in relation to other crops, ecologies, and farming practices.