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Opinion Article

Role of Microorganism for Enhancing the Availability of Plant Nutrition

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DESCRIPTION

Crop productivity and quality are influenced by nutrient availability. Although fertilization is a key strategy for enhancing plant nutrition, its effectiveness can be constrained, and the manufacture and application of fertilizers frequently cause environmental issues. Numerous soil microorganisms have the ability to improve plant nutrient uptake, providing environmentally friendly ways to meet plant nutrition needs. Benevolent microorganisms improve plants ability to absorb macro and micronutrients [1]. Terrestrial plants typically require a list of elemental nutrients from the soil to promote healthy growth and development in addition to the elements carbon (C), hydrogen (H), and oxygen (O) that can be provided by CO_2 and water [2]. These essential nutrients include iron (Fe), manganese (Mn), copper (Cu), zinc (Zn), boron (B), molybdenum (Mo), chlorine (Cl), and nickel (Ni), which are collectively referred to as micronutrients due to the relatively low plant requirement. These essential nutrients also include nitrogen (N), phosphorus (P), potassium (K), sulphur (S), magnesium (Mg), calcium (Ca), and boron (B).

Combination and concentration of mineral nutrients

Each macronutrient and micronutrient shortage in plants has different effects on the molecular and phenotypic levels. The combination and concentration of mineral nutrients present in the soil play a significant role in determining plant growth and development [3]. The availability of some nutrients can alter as a result of changes in the climate and atmosphere, which can have a negative impact for plants. It is crucial to comprehend how plants have evolved to overcome some of these challenges in a world where the climate is constantly changing. Biostimulant types include silicon, protein hydrolysates, macro algal seaweed extracts, humid substances, and bacterial and fungal strains as well as protein hydrolysates and protein hydrolysates [4]. The effects of bacterial biostimulant strains on many plant kinds have been quite encouraging and they are also very easy to produce, economically viable, and environmentally friendly. The efficiency of plants nitrogen uptake is indirectly increased by improvements in nutrient availability and root development. To meet the ideal plant need, specific direct methods showing increased expression of several nutrient transporters, primarily N and P. By improving nutrient uptake efficiency, bacterial biostimulants boost plant growth in general and production as a result [5].

CONCLUSION

Understanding the mechanisms underlying these advantageous plant microbe interactions is of increasing interest because the activities of these microbial communities are crucial for plant growth under abiotic and biotic stresses and could result in the creation of novel strategies to increase crop yields and stress resistance. We summarize our current knowledge of the beneficial interactions of soybean plants with arbuscular mycorrhizal fungi nitrogen-fixing rhizobia, fungal and bacterial entophytes. Significant knowledge gaps that must be filled in order to fully utilize beneficial microbes. Plants can engage in symbiotic connections with fungal species in addition to symbiotic relationships with bacteria. Around 80% of all plants according to current estimates of the frequency of plant-mycorrhizal interactions are thought to form some sort of mycorrhizal symbiosis. There are various groups of mycorrhiza which vary in their host plants, structural morphology, and methods for colonisation plant tissue. However, there are two primary types commonly recognised as the most prevalent and hence the most important ecologically. The fungus known as endomycorrhizae penetrate the cortical cells cell walls in plant roots to form relationships with their hosts. While ectomycorrizae actually do not penetrate the cortical cells, they do create a substantial hyphae network between them.

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