Medicon Agriculture & Environmental Sciences
Volume 2 Issue 2 February 2022
Editorial

Mycorrhiza is the Ideal Solution for Global Agriculture

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Received: January 20, 2022; **Published:** January 22, 2022

Given the world's demographic expansion, agricultural production must at least be doubled by 2050 to feed the world's population. However, the agricultural sector is increasingly suffering from harsh climatic conditions, mainly drought, and soil nutrient depletion. These conditions dramatically affect the qualitative and quantitative production, and increase the demand for chemical fertilizers. Unfortunately, what complicates things further is that the world currently recognizes a surge in fertilizer prices in general and especially those containing nitrogen. In addition, according to the World Bank, the rise in fertilizer prices is expected to continue. Therefore, there is an urgent need to seek effective, ecological, and sustainable alternatives to meet global nutritional needs.

Mycorrhiza is a durable symbiotic association between fungi and plant roots. Moreover, mycorrhizal fungi, including other symbiotic soil microorganisms such as nitrogen-fixing bacteria, phosphate-solubilizing bacteria, and biological control agents, are able to interact synergistically to promote plant growth and increase yield. This quantitative and qualitative improvement in Crop yield is achieved through several mechanisms, namely:

I. The increase in the volume of the prospected soil; thanks to the exploration of the soil, even in its microporosity, by the external mycelium. This immense exploration of the soil causes a considerable improvement in the absorption of water and mineral elements from the soil such as nitrogen, phosphorus and potassium as well as trace elements. Which constitutes an alternative (biofertilizer) effective and sustainable against the use of chemical fertilizers.
II. The production of phytohormones such as auxin, cytokinin and gibberellic acid or the reduction of ethylene production. These substances are chemical messengers that control plant growth and development. Mycorrhizal fungi use this mechanism to increase the root architecture of the host plant in order to receive more photoassimilates exuded by the roots, and benefit from more association sites with the host plant. In terms of analysis, it adapts the root system and subsequently the plant to the specific environmental conditions.
III. chemical and pathogen protection, mycorrhiza offers a wide range of protection against biotic and abiotic stress. In addition to improving soil structure by contributing to the formation of aggregates, the mycorrhizal fungus allows plants to tolerate soil contamination by heavy metals, salinity and Al toxicity on acid soils. This cortege of protection also concerns root pathogens such as pathogens of weakness, root necrosis caused by Fusarium and Phytophthora cinnamomi. Protection against biotic agents occurs through two main mechanisms: the formation of a mechanical barrier against the pathogen and the production of antibiotic substances. In addition, researchers have recently discovered that the fungus is also involved in the immune memory of the plant. Ultimately, here mycorrhiza is the perfect and ecological alternative to chemical pesticides.

In conclusion, the main concern of humanity in the future years will be to feed a growing world population in a sustainable way; while preserving natural resources and improving environmental conditions. The use of mycorrhizal fungi as well as symbiotic agents in general is the best effective, ecological and sustainable solution that we have in our hands today to respond. Therefore, it is necessary that the global scientific committee directs more research with the aim of improving, facilitating and encouraging the use of these symbiotic agents in agriculture.

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