

## MYCORRHIZAE: A POWERFUL PARTNER FOR HEALTHIER SOIL AND CROPS

*By Martin Botha*

In the world of modern agriculture, the emphasis often lies on chemical fertilisers and advanced machinery but beneath our feet lies a powerful and intricate network that has been quietly supporting plant life for millions of years. This network consists of soil mycorrhizae, an essential component of soil health that can significantly enhance crop productivity and sustainability. The hidden power of soil mycorrhizae holds immense potential for promoting soil health, enhancing crop productivity, and achieving sustainable agriculture. By understanding and harnessing these beneficial fungi, agricultural professionals can unlock new opportunities for growth and resilience. Whether through selecting appropriate crops, applying inoculants, or managing soil conditions, integrating mycorrhizae into farming practices is a step towards a more sustainable and prosperous future.

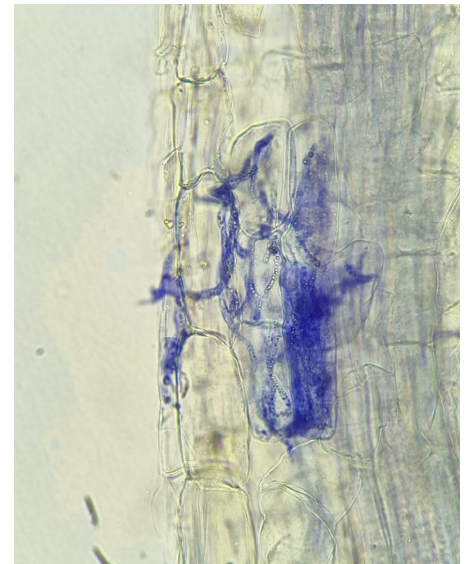
### THE BASICS OF MYCORRHIZAE

Soil organisms are responsible for many vital functions in the soil, including decomposing and breaking down organic matter, fixing atmospheric nitrogen, cycling nutrients, improving soil structure, improving soil fertility, and improving water holding capacity.

Mycorrhizae are soil organisms and a type of fungi that form symbiotic relationships with the roots of most plants. These fungi extend the root system, allowing plants to access nutrients and water more efficiently. In return, the plant supplies the fungi with carbohydrates produced through photosynthesis. This mutualistic relationship is fundamental to the health of both plants and soil.

There are two main types of mycorrhizae: arbuscular mycorrhizal fungi (AMF) and ectomycorrhizal fungi (EMF). AMF penetrates the root cells and is commonly found in most crops, while EMF forms a sheath around the roots and is more common in forest trees. It is important to understand the difference between AMF and EMF to apply the right kind of mycorrhizae to benefit crops.

Mycorrhizae play a critical role in nutrient cycling, soil structure, and plant community dynamics in natural ecosystems. They enhance the resilience of plants to environmental stressors such as drought, pathogens, and nutrient deficiencies. This natural partnership is vital to sustainable agriculture practices.



In-house light microscopy images of Maize root showing the arbuscular mycorrhizal hyphae network (stained by trypan blue) after planting.

### BENEFITS OF MYCORRHIZAE FOR SOIL HEALTH

- **Enhanced Nutrient Uptake:** One of the primary benefits of mycorrhizae is their ability to improve nutrient uptake. Mycorrhizal fungi increase the surface area of plant roots, allowing them to access nutrients that would otherwise be unavailable. This includes essential nutrients like phosphorus (P) and nitrogen (N) and micronutrients such as zinc (Zn) and copper (Co).
- **Improved Soil Structure:** Mycorrhizae also contribute to better soil structure by producing a sticky protein called glomalin. This protein binds soil particles together, improving soil aggregation and porosity. Well-aggregated soil allows for better water infiltration and root growth, leading to healthier plants.
- **Symbiotic Associations:** Symbiotic relationships between bacteria and plants can have significant benefits for both the plant and the microorganism. The bacteria or fungi provide nutrients and water to the plant in exchange for energy-rich sugars produced by photosynthesis. The fungal hyphae extend out from the roots of the plant and increase the effective root surface area, allowing the plant to absorb more water. For example, nitrogen-fixing bacteria, such as rhizobia, can convert atmospheric nitrogen into a form that plants can use. This can be a significant source of nitrogen for leguminous plants. In exchange for this nitrogen source, the plants provide the bacteria with carbohydrates.
- **Disease Resistance:** Mycorrhizal fungi can help plants resist diseases by outcompeting pathogenic microbes in the rhizosphere. They produce antibiotics and other compounds that inhibit the growth of harmful organisms. This natural defence mechanism reduces the need for chemical pesticides and promotes a more balanced soil microbiome.

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### PUTTING MYCORRHIZAE TO WORK FOR YOU

Although mycorrhizae can form this beneficial symbiotic relationship with the roots of most plants, not all crops benefit equally from mycorrhizae. Here's how to best integrate mycorrhizae into farming practices:

- **Selecting the Right Crops:** Understanding which crops respond best to mycorrhizae allows you to maximise the benefits.
- **Inoculation Techniques:** There are various ways to introduce mycorrhizae into your soil, such as seed coatings, soil drenches, or root dips. Choosing the right method ensures optimal establishment and effectiveness.
- **Creating a Mycorrhizae-Friendly Environment:** Practices like reduced tillage, cover cropping, and biologic amendments foster a healthy habitat for these beneficial fungi. Additionally, minimising chemical fertilisers and pesticides helps preserve mycorrhizal colonies.

### THE FUTURE IS MYCORRHIZAL: PRODUCT RECOMMENDATIONS

Embracing the power of mycorrhizae is a long-term investment in the health of soil and crops. Contact Nutrico today for a tailored consultation and learn how to harness the hidden potential beneath your feet.



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