

MYCORRHIZA: THE ROLE OF MYCORRHIZAL FUNGI IN ECOSYSTEMS AND THEIR MUTUALISTIC SYMBIOSIS WITH ROOT SYSTEMS

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Mycorrhiza — (from the Greek „Myco“ meaning fungus, and „Rhiza“ meaning root) represents a long-lasting and intimate fungus-root association characterized by a mutualistic symbiosis between mycorrhizal fungi and plant root systems.

The significant role and importance of mycorrhizal fungi in agriculture were first recognized in the 19th century by the German botanist Albert Bernard Frank.

Mycorrhizal fungi act as natural biostimulants by enveloping plant roots in the soil and promoting their growth. Thus, plants and mycorrhizal fungi establish a mutualistic relationship—a close cooperation between non-photosynthetic fungi and chlorophyll-containing green plants.

Mycorrhizal fungi, alongside numerous beneficial effects, assist plants in adapting to environmental conditions, enrich photosynthesis, and improve soil structure, notably enhancing the uptake of water and essential nutrients such as nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), iron (Fe), magnesium (Mg), and manganese (Mn). In return, the fungi receive from the plants synthesized organic compounds, primarily carbohydrates.

Experimental studies demonstrate that environmental factors, including temperature, pH, moisture, and nutrient availability, significantly influence the proliferation and activity of mycorrhizal fungi.

This research also explores the communication pathways among plants, specifically the concept known as the „WOOD-WIDE WEB“. It provides a detailed overview of the different types of mycorrhiza found in nature, including the classification of endomycorrhizal and ectomycorrhizal fungi, their functional characteristics, and the mechanisms of mycorrhizal symbiosis.

The application of mycorrhizal fungi constitutes a foundational element of organic farming and is a key factor in improving crop yields. Mycorrhizae are widespread worldwide in soils and across a diverse range of plant species, recognized as essential components of healthy ecosystems and sustainable agricultural practices. Ongoing research continues to reveal the systemic importance of mycorrhizae in enhancing plant health and maintaining ecosystem stability.



Illustration 1: Mutualistic symbiosis of two plants with mycorrhizal fungi



Illustration 2 „Wood Wide Web“



Illustration 3: Commercially available mycorrhizal fungal complexes as biostimulants: „MycUp 360“ and „Resid HC“