

Carbon Cycling in Extreme Environments as Influenced by Mycorrhizal Plant and Fungal Communities

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Fungi

- Heterotrophic
- Saprobies, Pathogens, Mutualists

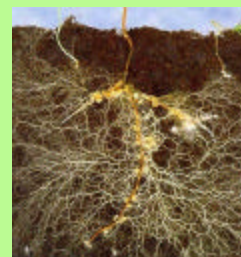


Mycorrhizae

- Literally: fungus - root.
- Word defines the relationship, not the symbionts
- Ubiquitous - found in virtually all ecosystems on Earth
- Used by agriculturalists for almost 100 years, but our understanding of the science is relatively new

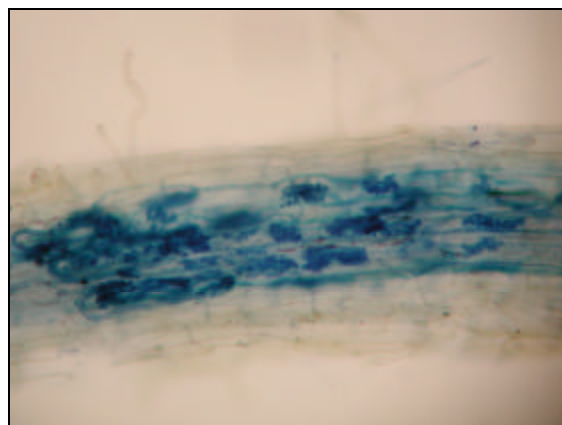
2 Main Types of Mycorrhizae

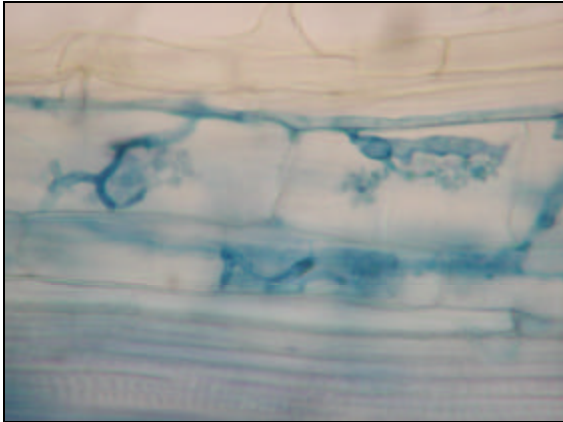
- Ectomycorrhizae
 - conifers, some other trees
- Arbuscular
 - grasses, forbes, shrubs, some trees



Arbuscular Mycorrhizal Fungi (AMF)

- Colonize >80% of plant species
- Supply nutrients (P) in exchange for excess C
- Increase surface area (H₂O)
- No mushrooms
- Microscopic



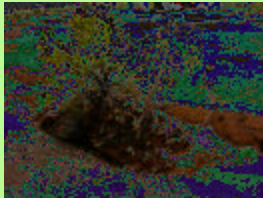


Benefits to Plants and Soil

- Protection from pathogens
- Water use efficiency
- Buffer against toxic metals, extreme pH, and extreme temperatures
- Promote diversity
- Seedling establishment support
- Soil formation
- Belowground C storage

Extreme Environments

- Desert
- Alpine



YNP Thermal Areas

- Soils:
 - Thermal (up to 130° F)
 - Toxic metal concentration (As, Mg, Mn, Se, Fe...)
 - Extreme pH (2-10)
 - Limited OM
 - Few plants able to grow, only with AMF!

Current Research Objectives

- Gain a better understanding of intra- and interspecific functional differences
- Investigate C cycling differences in response to heat (thermal soils)
- Assess the role of community dynamics in extreme environments
- Apply to restoration ecology



