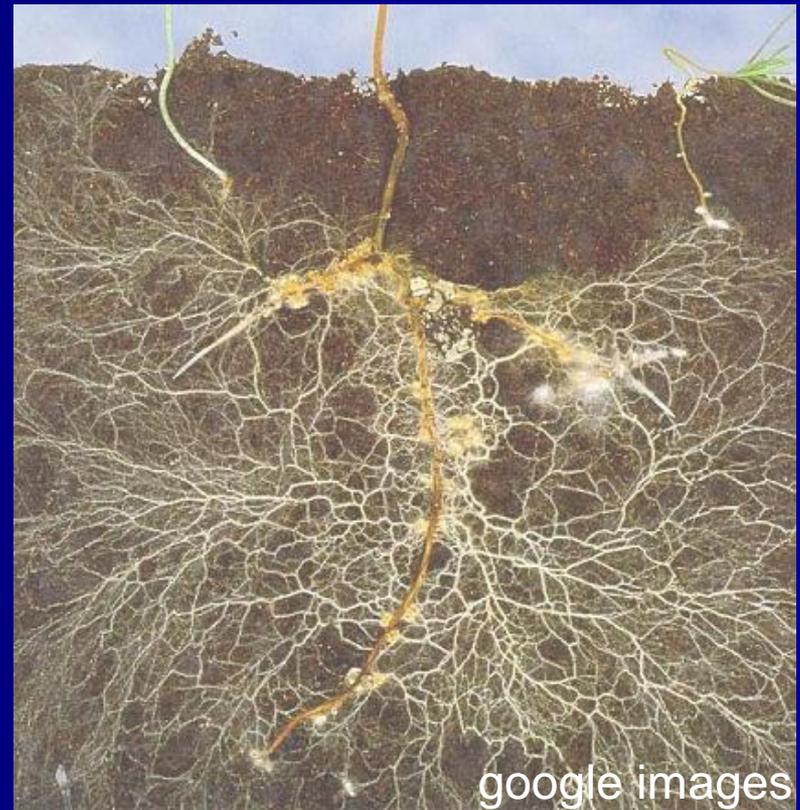


What is Mycorrhizae /

prof. dr. Idham Ali Abed / Collage of Agriculture
/ University of Anbar

- *a mutualistic symbiosis between plant and fungus*
- *different types are recognized*
- types can be distinguished by their positions along two gradients
- an ecosystem normally contains a mixture of types of mycorrhizal associations



MYCORRHIZAE

- In nature approximately 90% of plants are infected with micorrhizae.
- 83% Dicots
- 79% Monocots
- 100% Gymnosperms

TYPES OF MYCORRHIZAE

- two major types: ectomycorrhizae and endomycorrhizae (aka arbuscular mycorrhizae)
- other types include arbutoid, ericoid, monotropoid, orchid mycorrhizae



Arbutoid mycorrhizal fungus

wikipedia

ECTOMYCORRHIZAE

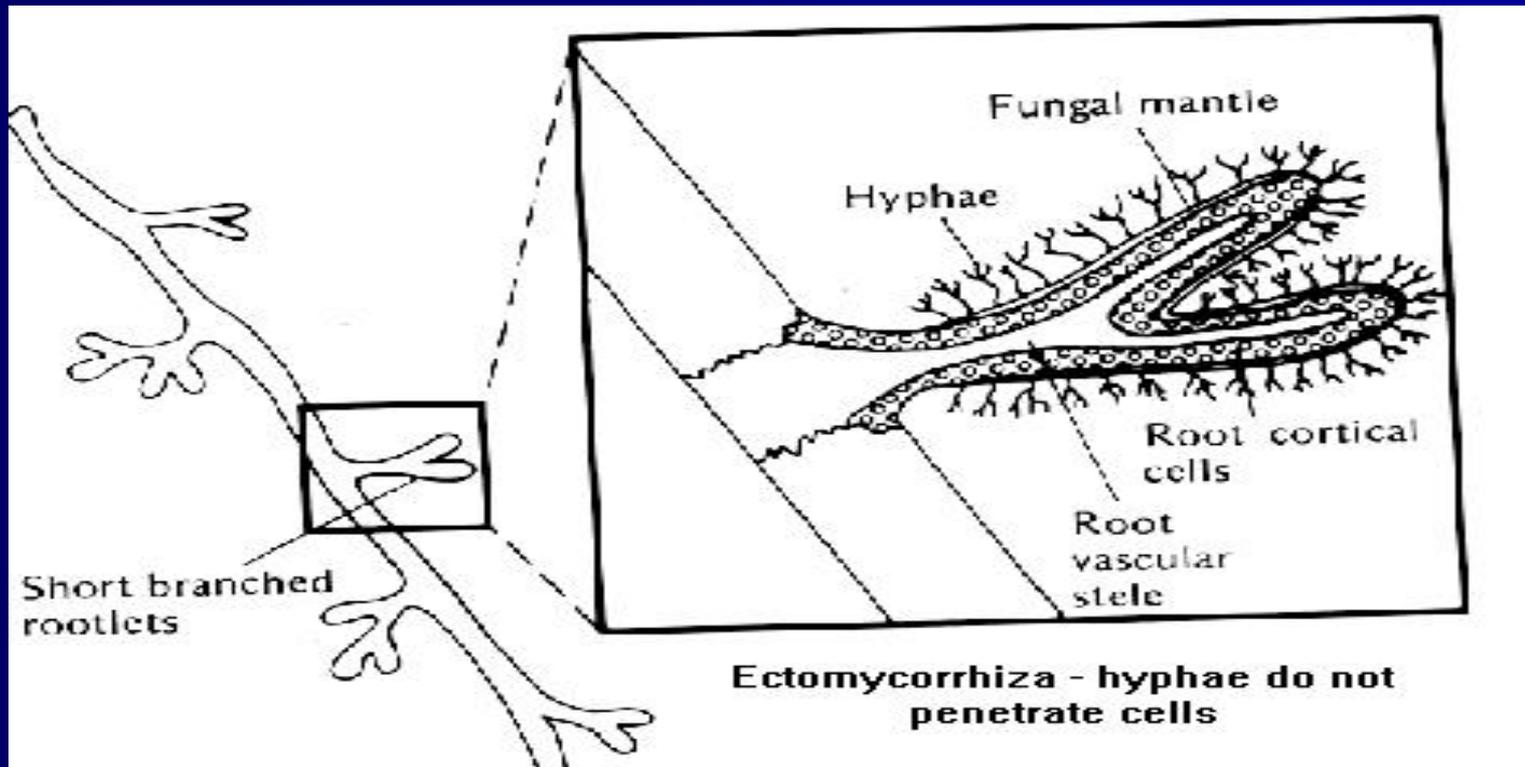


- Ectomycorrhizal (ECM) fungi form mutualistic symbioses with many tree species and are regarded as key organisms in nutrient and carbon cycles in forest ecosystems¹
- This picture sheds light on ectomycorrhizae and its profound influence on coffee plantation ecology

ECTOMYCORRHIZAE

- fungal component are mainly basidiomycetes, but some ascomycetes
- at least 5,000 species of fungi involved in ectomycorrhizal relationship²

Fungal hyphae surrounds, but do not penetrate the cell walls of the roots



ECTOMYCORRHIZAE

- the function of the ectomycorrhizal mutualism depends on the ability of the fungal symbionts to take up nutrients
- the symbiotic nutrient exchange plays a major role in plant nutrition as well as in resistance of plants against pathogens, heavy metals, drought stress, etc.³



ECTOMYCORRHIZAE

- Regulated gene expression is an important mechanism for controlling ectomycorrhizal symbiosis development and functioning.
- Gene profiling studies have identified genes that are required for fungal attachment, plant defense, and symbiosis-related metabolism.⁴



- Example of *Pt* ectomycorrhizae development from *Pt* vegetative mycelium artificial nursery seedbed inoculations (seedlings on right) as compared with routine development of naturally occurring ...

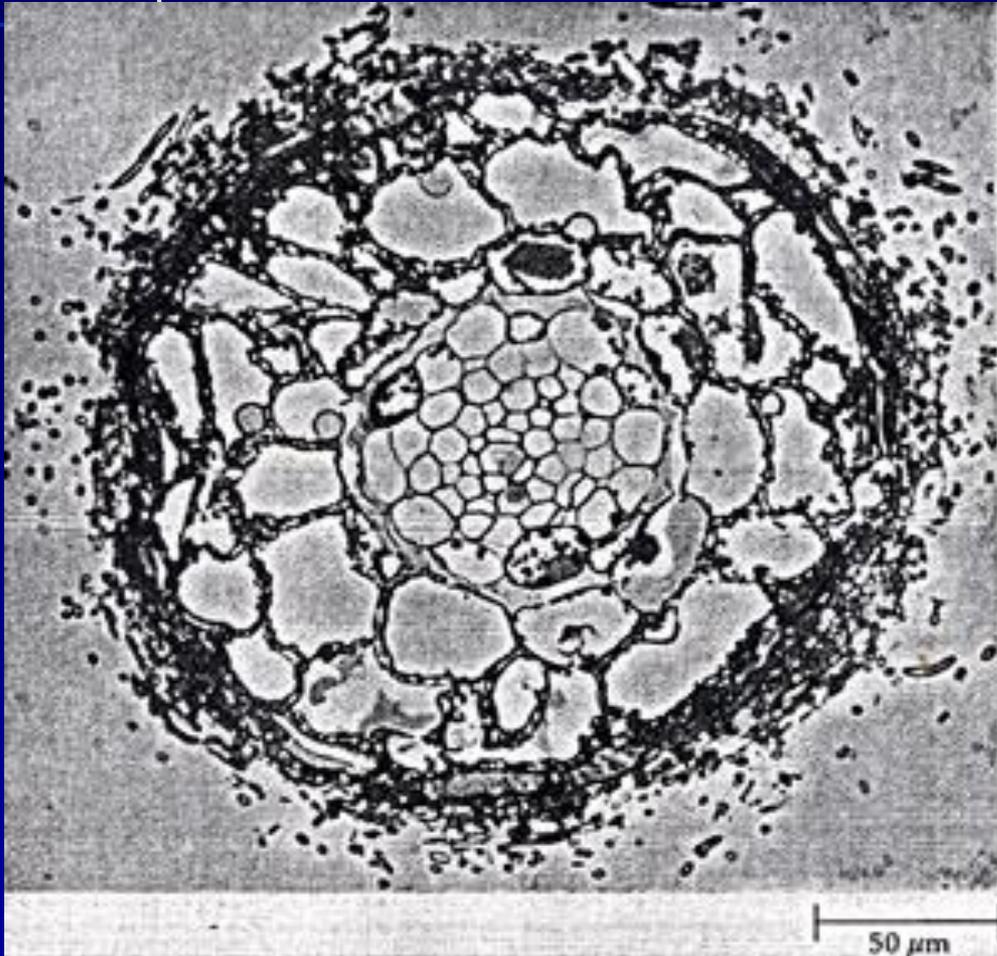


ENDOMYCORRHIZAE



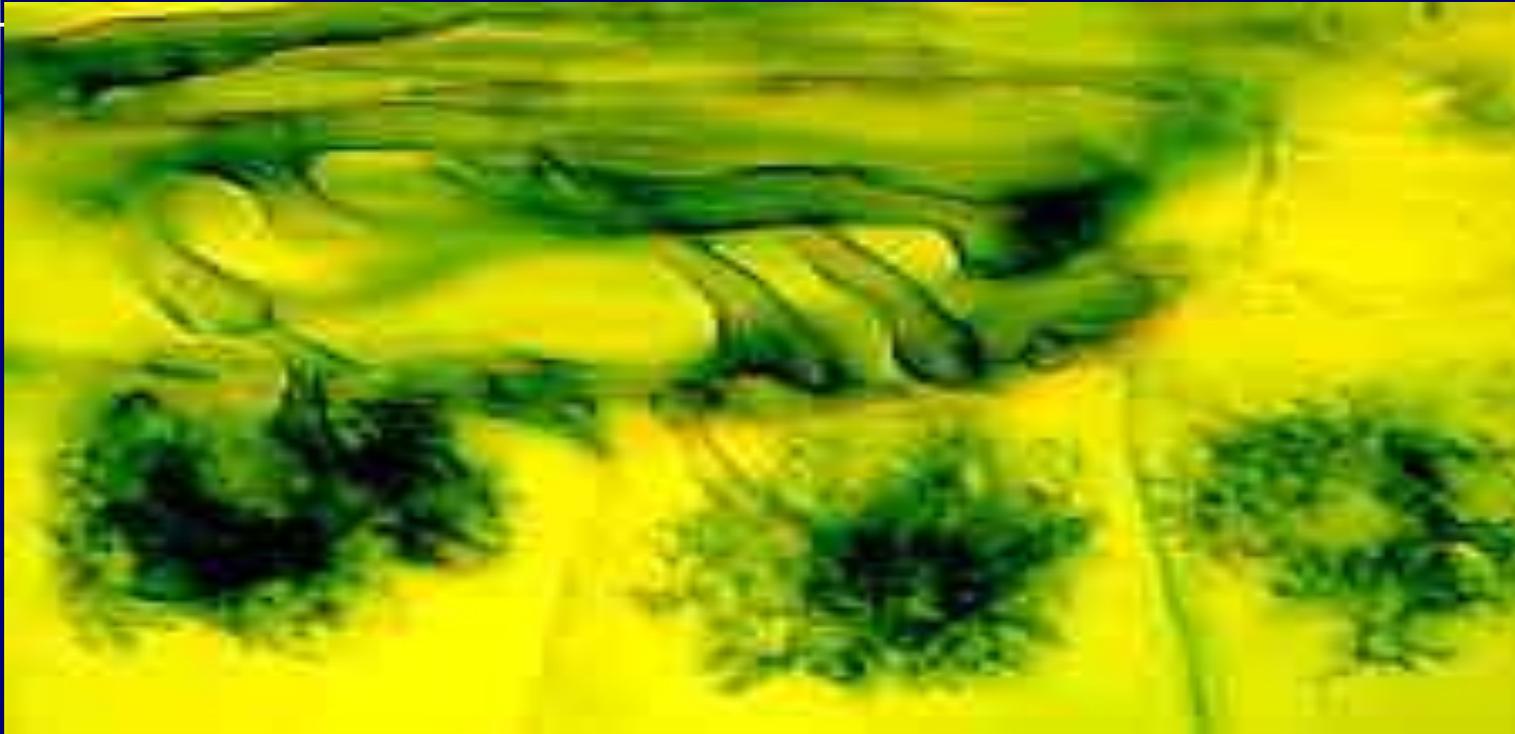
- aka arbuscular mycorrhizae
- found in the roots of roughly 70% of all plant species
- fungal component are Glomales
- hyphae penetrates the outer cells of plant root¹

ENDOMYCORRHIZAE



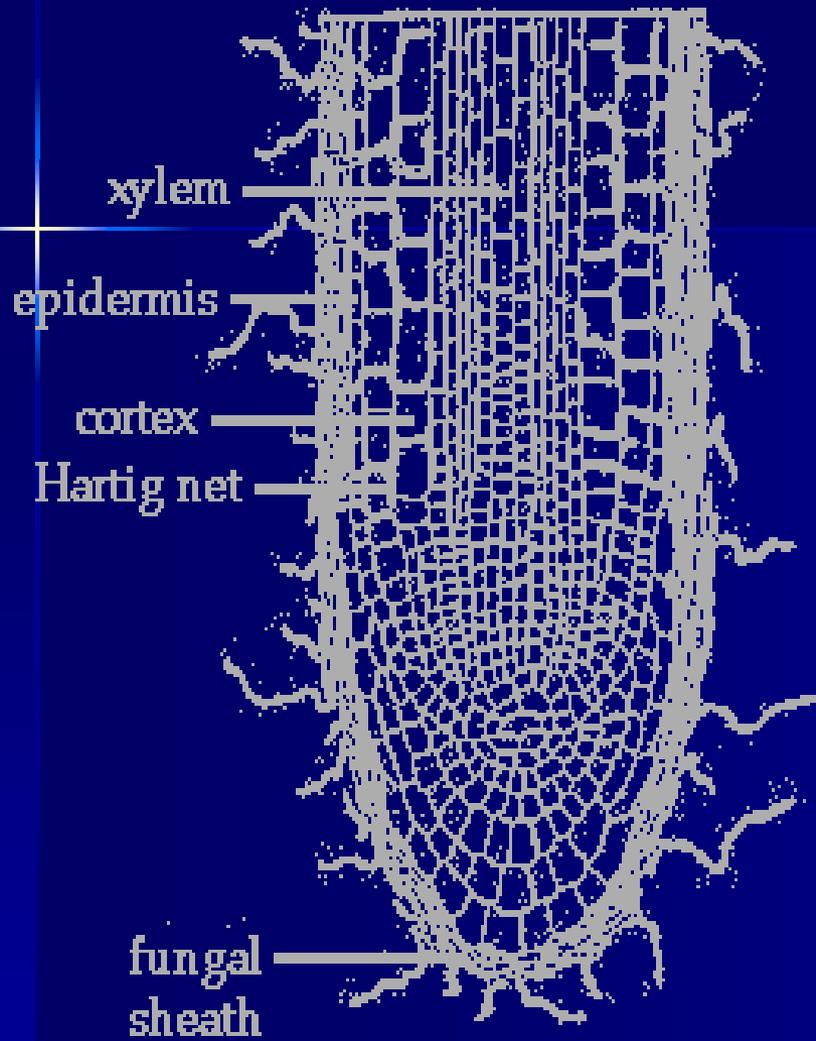
- present in the earliest plant fossils
- capable of increasing crop yields with lower phosphate and energy inputs¹
- Also, confer drought and disease resistance, reduce pest damage and nematode infection, promote seed production, and increase the fitness of plant offspring

Endomycorrhizae are more common than Ectomycorrhizae

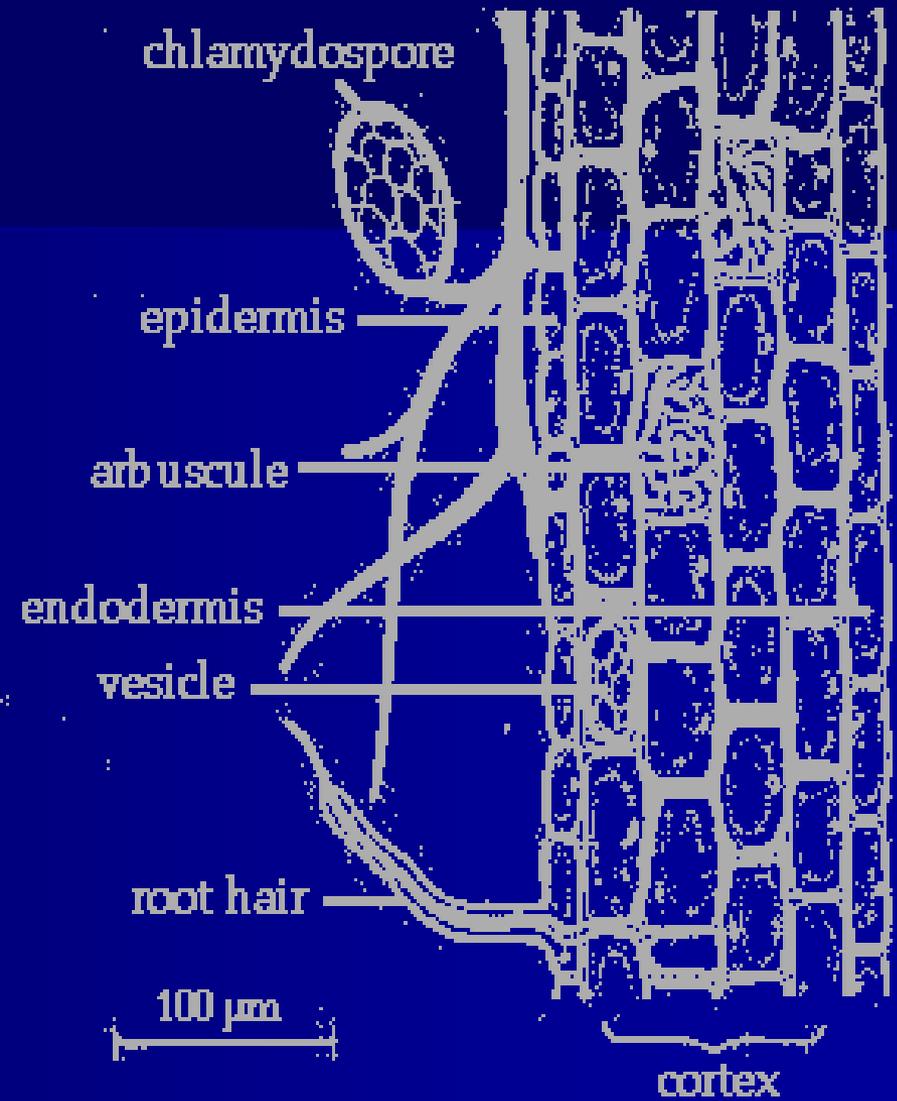


- hyphae and arbuscules of an **endomycorrhizal** fungus in *Asarum* (wild ginger) (see Fig 15 in Brundrett & Kendrick 1988 Can. J. Bot. 66: 1153)

Ectomycorrhizae



Endomycorrhizae



fungus + **root** = **mycorrhizae**
(*mycos*) (*rhiza*)

