Mycorrhizae
Invisible Partners, Essential Symbiosis

Mycorrhizae are the rule

90% of all plants contain mycorrhizae
Two major types

Ecto

Form a fungal sheath around plant roots

Endo

No external fungal sheath, mycelium is mostly within roots

Types of mycorrhizae

Evolutionary Relationships between Mycorrhizal Fungi

Ascomycete & Basidiomycete spore formation

Basidiomycetes

Ascomycetes

Ectomycorrhizae

Primarily Basidiomycetes and Ascomycetes
Includes most of the mushrooms that we collect in forests of the PNW

Components of Ectomycorrhizal systems

Form dense sheath of fungal cells surrounding host root

Typical ectomycorrhizal roots

Hartig net of Ectomycorrhizae

Endomycorrhizae

No external mycelium covering host root
Fungal exchange structures are within host cell wall (but not cell membrane)

Three main groups

- Arbuscular
- Ericaceous
- Orchidaceous

Arbuscular mycorrhizae

Most common type on annual herbaceous plants
Nearly all agricultural crop plants, grasses, legumes
Some trees: elms, maples, legumes

Fungi are in the order Glomales

No discernible change in root structure
Form "arbuscles"—tree-like exchange structures within cell wall, but not cell membrane
Some AM fungi form storage vesicles

Other Endomycorrhizae

Ericaceous

Limited to plants in the Ericales
Three types

Orchidaceous

Nutrient interactions

Mycorrhizae favored in high-light, nutrient-poor sites
Hyphae great expand absorptive surface beyond depleted rhizosphere
Hyphae much smaller diameter, able to penetrate sites unavailable to feeder roots.

Tree supplies sugars (reduced carbon)

Fungi supplies

Phosphorous
- Gains with special enzymes, chelators

Nitrogen
Water