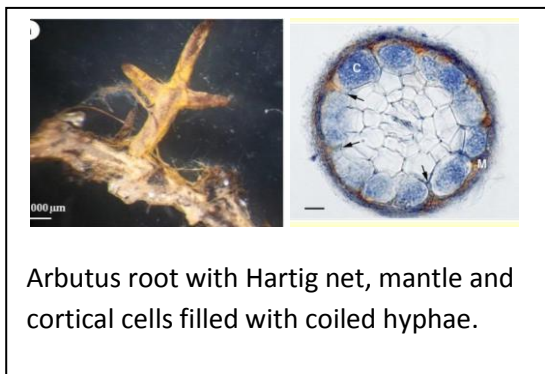


Unit 4: Mycorrhizae biofertilizers (cont--)**Types of Mycorrhizal associations****3) Ectendomycorrhizae:**

- The intermediate mycorrhizae have the characteristics of both ectomycorrhizae and endomycorrhizae.
- Ectomycorrhizae like-fungal mantle sheath which is thin or lacking and reduced Hartig net.
- Endomycorrhizae like- intracellular penetration of hyphae inform of coils and haustoria like structure.
- Commonly infect coniferous and deciduous trees such as *Pinus*, *Betula* and *Quercus*.
- Fungi type- Ascomycetes (*Wilcoxina spp.*)
- The Ectendomycorrhizae is replaced by ectomycorrhiza as the seedling matures.
- The mineral nutrients passes through the fungal mycelium and reaches root cortical cells.

4) Arbutoid Mycorrhizae:

- Transition between ecto- and endomycorrhizae.
- Common in Trees like *Arbutus*, *Pyrola* and many woody shrubs.
- Fungi type- Basidiomycetes (*Boletus*, *Amanita* etc.).
- Feature- intracellular coils in outer cortical cells along with mantle sheath and Hartig's net.

**5) Monotropoid Mycorrhizae:**

- This type of mycorrhizal association is with the family Monotropaceae genus *Monotropa*
- Plant type- achlorophyllous throughout their lives.
- Fungi type- Basidiomycota members such as *Boletus edulis*, *Rhizopogon* etc.
- Plants depend on fungi for carbon and energy.
- The members of Monotropaceae grow on forest floors under neighboring plants - *Fagus*, *Pinus*, *Quercus*, *Salix*.

- Carbohydrates pass from conifer to *Monotropa* via their common mycorrhizal partner.
- Fungal sheath and Hartig's net, limited hyphal penetration into epidermal cells.
- Fungus also produces small pegs that projects into the root cells and then expand, surrounded by the plant cell membrane.
- This three-membered symbiosis involves a direct nutritional connection between a tree host, a mycorrhizal fungus and a parasitic higher plant.

