MYCORRHIZAE

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Introduction to Mycorrhizae

- **Mycorrhizae represents a *mutualistic symbiosis* between the *root system of higher plants* and *fungal hyphae*.**
- **Frank** first noted the existence of such a characteristic association in the roots of **Cupulifereae** in 1985 and coined the term '*mycorrhiza*'.
- Most prevalent symbiotic association between the soil microorganism and roots of plant.
- Mycorrhizal associations are highly influenced by the toxic substances (alkaloids, phenolics, terpenoids, tannins, stilbenes, erc) that, when present, are essentially concentrated in the roots.
- Occur on more than 90% of the vascular plants.

Advantages of mycorrhizae:

- The fungus derives nutrients via the root of the plant.
- The fungal hyphae act like a massive root hair system, scavenging minerals from the soil and supplying them to the plant
- Due to this associationship the plant partner, in addition to the nutritional benefits, develops drought resistance, tolerance to pH and temperature extremes, and greater resistance to pathogens due to ‘phytoalexins’ released by fungus.

Classification of Mycorrhizae

- The two major types of Mycorrhizae are termed as below:
  - ***Ectomycorrhizae***
  - ***Endomycorrhizae***
- There is a third type termed '***Ectendomycorrhizae***' which is more or less a combination of the above two as recognised by some.

Ectomycorrhizae (Ectotrophic mycorrhizae):

- Common on many forest trees, particularly pine, beech and birch which are of much economic value.

- The fungal hyphae form a sheath over the outside of the roots which is generally called **'mantle of hyphae'.**

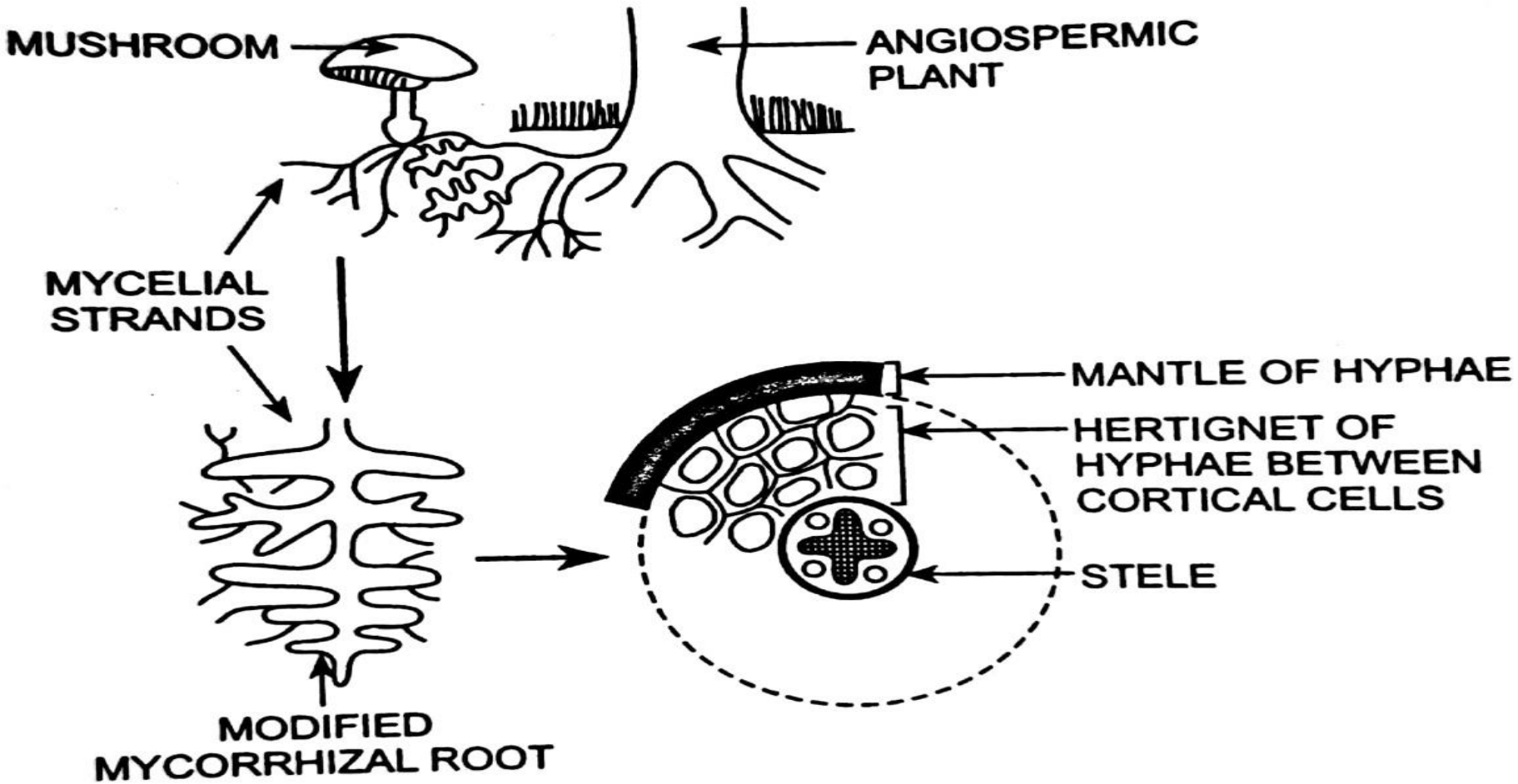
- From this mantle, a hyphal network called ***hartignet*** extends into the first few layers of the cortex or rarely deeper and then reaches the endodermis. Root hair formation is suppressed in the infected root and the root morphology is changed by the repeated formation of short branches with blunt tips and limited growth.

- Common ectomycorrhizal genera are:
  - Basidiomycetes, particularly Agaricales such as *Amanita, Tricholoma, Russula, Lactarious, Suillus, Leccinum* and *Cortinarius.*

  - Some Ascomycetes such as the truffles have also been reported.

Ectomycorrhizae (Ectotrophic mycorrhizae) cont…

- Fungi of ectomycorrhizae secrete various growth promoting substances such as auxins, cytokinins and gibberellic acids.
- They produce some antimicrobial substances which protects the host plant against soil-borne pathogens.
- The fungi derive their carbon from the host in the form of glucose, fructose or sucrose which is ultimately converted to mannitol, trehalose, and glycogen.
- These mycorrhizae are known to stimulate plant growth and nutrient uptake in soils of low to moderate fertility.



Ectomycorrhiza (Ectotrophic mycorrhiza)