Mycorrhiza/ Fungal symbiosis

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What is Mycorrhiza

- Term mycorrhiza was first coined by A.B Frank in 1885 for the symbiotic association between plant and fungus
- Mycorrhiza (fungus-root) can be defined as a symbiotic association between fungi and plant roots
- These associations have different structural and physiological functions
- According to Garret (1950) all mycorrhizal fungi can be included into an ecological category of “soil inhabiting fungi” but this term may incorporate many pathogenic fungi also which are soil inhabiting or soil borne

Classification of Mycorrhiza as per Frank

On the basis of trophic levels mycorrhiza Frank classified mycorrhiza into 2 types
1- ECTOMYCORRHIZA and

2- ENDOMYCORRHIZA

1-ECTOMYCORRHIZA/ Ectotrophic mycorrhiza- fine rootlets of plant are covered by pseudoparanchymatous tissue of fungus which forms a mantle or sheath over the roots, and it prevents the increase in the linear growth of root and provides it a swollen form or coralloid form.

The fungus enters inside the cortical region of root and forms a net like structure called as Hartignet. Sometimes it is present as external sheath or it is found in external cortex.

2-ENDOMYCORRHIZA/Endotrophic mycorrhiza- The external external hyphal mantle or sheath is absent or scanty. The fungal hyphae enters inside the root cortex and penetrates the cortical cells. This is not a destructive parasitic association but endomycorrhiza are present at certain times as a part of normal root development.

Marks recognised seven forms of mycorrhiza-

Mycorrhiza	Host Range	Types Of Relationship
1. Vesicular-arbuscular mycorrhiza	All groups of plant kingdom	Coiled intracellular hyphae, vesicle and arbuscules present
2. Ectomycorrhiza	Gymnosperms and Angiosperms	Sheath, intercellular hyphae
3. Ectendomycorrhiza	Gymnosperms and Angiosperms	Sheath optional, inter and intracellular hyphae
4. Arbutoid mycorrhiza	Very restricted,Ericales	Sheath, inter and coiled intracellular hyphae
5. Monotropid mycorrhiza	Very restricted,Monotropaceae	Sheath, inter and coiled intracellular hyphae
6. Ericoid mycorrhiza	Very restiricted, Ericales	No sheath, no inter- cellular hyphae, long, coiled
7.Orchid mycorrhiza	Very restiricted	only coiled, intracellular hyphae

Ectomycorrhiza

* Mostly Basidiomycetes and Ascomycetes are involved in forming ectomycorrhiza

* Plants developing ectomycorrhiza belong to the families pinaceae fagaceae , betulaceae , Juglandaceae , Myrtaceae and other tropical and temperate families.

* Fungi interacts with the feeder roots which undergo morphogenesis
Fungal mycelium forms a compact mantle upon the root surface and a network of mycelia in cortex which is called as hartig net .this net or mycelium never penetrate the endodermis.

* Fungi forming ectomycorrhiza are*Amanita muscaris, Boletus edulis,Cenoccus geophilus,Scleroderma, Rhizopogon*

Ectendomycorrhiza

This type of fungi shares features of both types ie. Ecto and endomycorrhiza.Mantle is not developed fully but fungal hyphae gets inside the cells of host plant roots and grows inside them.

This type of mycorrhiza is found in angiosperms as well as gymnosperms

Vesicular-arbuscular Mycorrhiza (VAM)

Most of the vascular plants near about 90% shows this symbiotic association which includes bryophytes, pteridophytes, gymnosperms and angiosperms.

Fungi involved in this association belongs to Zygomycotina, family endogonceae and 6 genera are *Glomus,Gigaspora,Acaulospora, Entrophospora,Sclerocystis,Scutellospora*

Ericoid mycorrhiza- This type occurs in the family Ericaceae except tribe Arbutoidae having woody shrubs or small trees found in peaty soil e.g. *Rhododendron, Vaccinum , Monotoa, Leucopogon* .

These plants have fine roots and the fungal members of ascomycetes like *Pezizella, Clavaria* forms the association in the outer region of cortical layer of roots

Arbutoid Mycorrhiza

#This type of mycorrhiza is found in family Ericaceae tribe Arbutoideae. It was first described in *Arbutus unedo.* Transition between endo and ecto is observed in this class of mycorrhiza so sometimes it can be referred as ectendomycorrhiza.

The plants of this family are woody or shrubs having short roots having sheath aswell as herting net.

Fungus penetrate the cortical cells and forms the coil like structure.

Monotropoid mycorrhiza- Achlorophyllous plants like *Monotora* belonging to family Monotropaceae develops this type of association.

Due to no chlorophyll this plant depends upon mycorrhizal fungi for carbon and energy.

The structure and function of monotropoid mycorrhiza changes with seasonal development of the host plant.

Orchid Mycorrhiza- Mostly Rhizoctonia, Ceratobasidium, Sebacina, Tulasnella of basidiomycotina infects the orchids.

Orchids germinates only after the infection by Endomycorrhiza eg *Rhizoctonia.*

These mycorrhiza are called as orchid mycorrhiza.

References

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2. College Botany Vol I- BP Pandey, S.Chand & Company Ltd, new Delhi.

thanks