

Botany (H) CBCS Syllabus WBSU

Semester-II

Core Course III: Mycology and Phytopathology

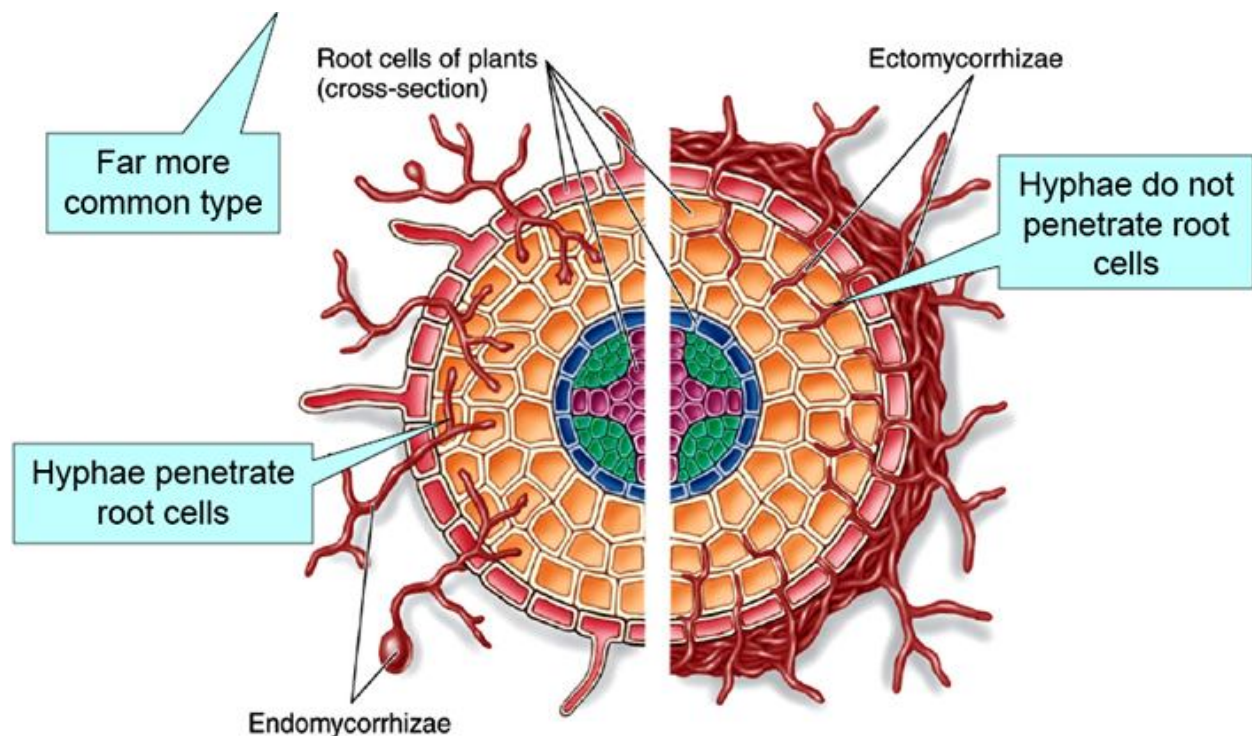
Course Code: BOTACOR03T

Unit 7: Symbiotic associations

Mycorrhiza

Mycorrhiza (singular), a term that means “fungus root,” describes the mutually beneficial, symbiotic relationship between fungi and plant roots. Symbiosis begins when fungal spores germinate and emerging threadlike structures, called hyphae, enter the epidermis of plant roots. After colonization of the root, the fungus sends out a vast network of hyphae throughout the soil to form a greatly enhanced absorptive surface area. This results in improved nutrient acquisition and uptake by plant roots, particularly elemental phosphorus (P), zinc (Zn), manganese (Mn) and copper (Cu) and water. In return, the plant provides carbohydrates for the fungi. There are more than 150 species of mycorrhizal fungi found around the world in all types of soils and climates. There are several general classes to categorize mycorrhizal fungi; however, the two most common classes are called ectomycorrhiza and endomycorrhiza.

Difference Between Ectomycorrhizae and Endomycorrhizae



Ectomycorrhizae vs Endomycorrhiza

More Information Online WWW.DIFFERENCEBETWEEN.COM

	Ectomycorrhizae	Endomycorrhiza
DEFINITION	Ectomycorrhizae is a type of mycorrhizal association in which fungal hyphae do not penetrate the cortical cells of the plant root	Endomycorrhizae is a type of mycorrhizal association in which fungal hyphae penetrate the cortical cells of the plant root and form vesicles and arbuscules
ABUNDANCE	Less abundant (only 4%)	Highly abundant (80%)
HYPHAE MANTLE	Produce a hyphae mantle	Do not produce a hyphae mantle
HARTIG NET	Produce a hartig net	Do not produce a hartig net
ARBUSCLES AND VESICLES	Arbuscules and vesicles are absent	Arbuscules and vesicles are present
FUNGI INVOLVED	Ascomycota and Basidiomycota	Glomeromycota
PENETRATION INTO CORTICAL CELLS	Do not penetrate into cortical cells of the roots	Penetrate into cortical cells of the plant roots
PLANTS	Conifers like Pinus, Cedrus, Abies, and deciduous non- conifers, like oak, beech, birch etc.	About 85% of vascular plants including orchids, shrubs and foliage plants, nut trees, etc.

Endomycorrhizal Structures

The most common type of endomycorrhizae is arbuscular endomycorrhizae. They are named based on the structures they produce, arbuscules and vesicles.

- **Arbuscules.** Colonization of roots begins by the secretion of enzymes by arbuscular endomycorrhizae allowing hyphae to penetrate the epidermal and fleshy cortical cells of plant roots. Two to three days after colonizing the cell, the hyphae form structures within plant cells called arbuscules (Latin for tree) which resemble tiny trees and serve to facilitate the transfer of nutrients within the cortical cells (Figure 1). Arbuscular endomycorrhizae provide the plant with certain fertilizer elements and water from the soil, and in turn, the plant provides sugars and other carbohydrates for the fungus.
- **Vesicles.** Between the cells, sac like structures, called vesicles (means little sac), form midway or at the terminal ends of the hyphae (Figure 2). Vesicles contain lipids and serve primarily as storage organs for the fungus. Vesicles can also serve as propagules that can colonize other parts of the plant root.
- **Spores.** Arbuscular endomycorrhizae hyphae also will give rise to spores, which serve the same function as seeds do to plants. Spores have very thick walls, which makes them very resistant to freezing and intense heat so they can survive for long periods of time. For this reason, spores are ideal for incorporating into growing media and for use as inoculants.

Benefits of Mycorrhizae

Mycorrhizal fungi allow plants to draw more nutrients and water from the soil. They also increase plant tolerance to different environmental stresses. Moreover, these fungi play a major role in soil aggregation process and stimulate microbial activity. According to the plant species and to the growing practices and conditions, mycorrhizae provide different benefits to the plants and to the environment:

- Produce more vigorous and healthy plants
- Increase plant establishment and survival at seeding or transplanting
- Increase yields and crop quality
- Improve drought tolerance, allowing watering reduction

- Enhance flowering and fruiting
- Optimize fertilizers use, especially phosphorus
- Increase tolerance to soil salinity
- Reduce disease occurrence
- Contribute to maintain soil quality and nutrient cycling
- Contribute to control soil erosion

Sources:

<https://gpnmag.com/article/mycorrhizae-description-of-types-benefits-and-uses/>

<https://www.plantscience4u.com/2013/03/ectomycorrhizae-and-endomycorrhizae.html#.XoX8HtQzblU>

<https://www.differencebetween.com/difference-between-ectomycorrhizae-and-endomycorrhizae/>

<http://www.mykepro.com/mycorrhizae-benefits-application-and-research.aspx>

*Used for Study Purpose only.

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