



Arbuscular Mycorrhizal fungi: an evolutionary- developmental perspective

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INTRODUCTION

Arbuscular Mycorrhiza is mutuality associations formed between the roots of 80 % of terrestrial plant species and fungi from the small phylum Glomeromycota. The term “mycorrhiza” was coined by A. B. Frank, a scientist in Germany, more than 100 years ago. It literally means fungus-root, and describes the mutualistic association existing between a group of soil fungi and higher plants. The association is based on the plant component providing carbohydrates and other essential organic compounds to the fungi. In return, the fungal component, which colonizes both the root and the adjacent soil, helps the plant take up nutrients by extending the reach of its root system. There are many types of mycorrhizal association two are of major economic and ecological importance: ectomycorrhizal associations, and the endomycorrhizal association of the arbuscular- vesicular (AV) associations, the fungi invades the cortical region of the host root without penetrating cortical cells. The main diagnostic features of this type of mycorrhiza are (i) the formation within the root of a hyphal network known as the Hartig net around cortical cells and (ii) a thick layer of hyphal mat on the root surface known as sheath or mantle, which covers feeder roots. Infection of host plants by ectomycorrhizal fungi often leads to changes in feeder roots that are visible by the naked eye. Feeder roots colonized by the fungi are thicker and more branched than uncolonized roots; ectomycorrhizal feeder roots also tend to be colored differently in endomycorrhizal associations of the VA type, the fungi penetrate the cortical cells and form clusters of finely divided hyphae known as arbuscules in the cortex. They also form vesicles, which are membrane-bound organelles of varying shapes, inside or outside the cortical cells. Arbuscules are believed to be the sites where materials are exchanged between the host plant and the fungi. Vesicles generally serve as storage structures, and can serve as reproductive structures. Vesicles and arbuscules, together with large spores, constitute the diagnostic features of the VA mycorrhizas. Roots have to be cleared and stained in specific ways and examined under a microscope to see that they are colonized by VA mycorrhizal fungi. Because vesicles are not always found in these types of mycorrhizal associations, some researchers now prefer the designation arbuscular mycorrhiza (AM) over the term vesicular-arbuscular (VA) Mycorrhiza. Both AM fungi and ectomycorrhizal fungi extend hyphae from the root into the soil, and these external (or extraradical) hyphae are responsible for translocation nutrients from the soil to the root. Most ectomycorrhizal fungi belong to several genera within the class basidiomycetes, while some belong to the zygosporic zygomycetes and ascomycetes. On the other hand, AM fungi belong to six genera within the azygosporous zygomycetes.