FEATURES OF MYCORRIZAS TYPE SYMBIOSIS AT DIFFERENT PLANTS FAMILIES

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Abstract: *The present experiment highlights the process of colonization with mycorrhizas of the host plant, which starts with an exchange between the two partners of the symbiosis, followed by joining and fungi penetration in the plant cell. The symbiosis between plants and mycorrhizas fungi requires not only some changes in the root morphology of the studied plants, but also alterations of the fungal cell. The researches demonstrate the association of the hifa with host tissue, the crossing of the intracellular spaces, the spread in the cortical cells and the formation of coiled hifa within them. The cell wall crossing varies according to the anatomy of root, but it involves two possible ways: the mechanical way and the enzymatic way. Some hyphae remain in the intercellular space and some of them form arburscular structures. In this experiment was inoculated and highlighted the mycorrhiza of genus Glomus at the plant species as: Zea mays (on which we performed root cross sections), Juniperus scapula, Spireea biliardi, Pennisetum alopecuroides. In order to highlight the mycorrhizas symbiosis, the fragments plants were taken from the root of the studied plants, they were fixed, were included in modules, were molded and semifine sectioned. It was pointing out that, after the inoculation and the symbiosis between the mycorrhizas and Zea mays species, the hypha penetrates the intracellular spaces of the epidermis, crosses the hypodermis and reaches the cortex of the root, which is tightly associated with the host tissue and after that crosses the intracellular spaces and spreads in the cortical cells where they form so called hyphae complexes. In the cross-sections it can be see some strong vacuolated cells containing a dense cytoplasm and others containing in cytoplasm bulky nuclei and even highly vacuolated cells with signs of advanced senescence. At the Juniperus scapula and Spireea biliardi species are highlighted extra and intra cellular associations of vesicular type. In the case of fungi symbiosis with mycorrhizas of the Glomus genus with Pennisetum alopecuroides species, it can be seen, beside the hyphae associations by vesicular type and associations by arbuscular type, in different stages of development.*

Key words: *mycorrhizas, ectomycorrhizas, endomycorrhizas, symbiosis, rooth of plants, hyphae*

INTRODUCTION

Biology knowledge and plant root morphology made possible the evidence of the associations between some species of plants and fungi. Mycorrhizas is a mutual relationship between the ground, fungi and plant roots. The partners of this symbiosis are some fungi *Basidiomicetes Class*, and most *Zigomicetes Ascomicetes* and vascular plants (HARLEY & SMITH 1983, KENDRICK 1992, BRUNDRETT 1991).

Ectomycorrhizas is represented in most groups by *Eumycota*, including 25 families from *Basidiomycotina*, 7 of *Ascomycotina* and one from *Zygomycotina* (WALKER and TRAPPE, 1993). Even a species of *Glomus sp* (which is a endomycorrhiza), identified as *Glomus tubiforme* ectomicorize was found among some species of *Eucalyptus sp.*, *Pinus sp.* and *Quercus sp.* (WARCUP 1985).

MATERIAL AND METHODS

To highlight the symbiosis of mycorrhizas type (*Glomus spp*) were made the following steps: sampling (pieces of root about 5 mm), root fragments fixing, washing

samples, dehydration, inserting in resin, inserting samples in evidence modules, shaping samples at stereoscopic magnifier. The semi-sectioning was obtained at ultra microton YMTR-5. The coloring and highlighting the mycorrhiza at the roots of the analyzed samples was made with the technique Vierheiling H. (1988), and microscopic examination is performed at the microscope with the objectives 10x, 40 x on native apparatus.

RESULTS AND DISCUSSIONS

Following the cross section (figure 1) the species *Zea mays* inoculated with mycorrhiza fungi can see how the hyphae penetrates the intracellular space of the epidermis of the host cell, crosses the hypodermis, reach the cortex through which vesicles and arbors are formed in various stages of the development.

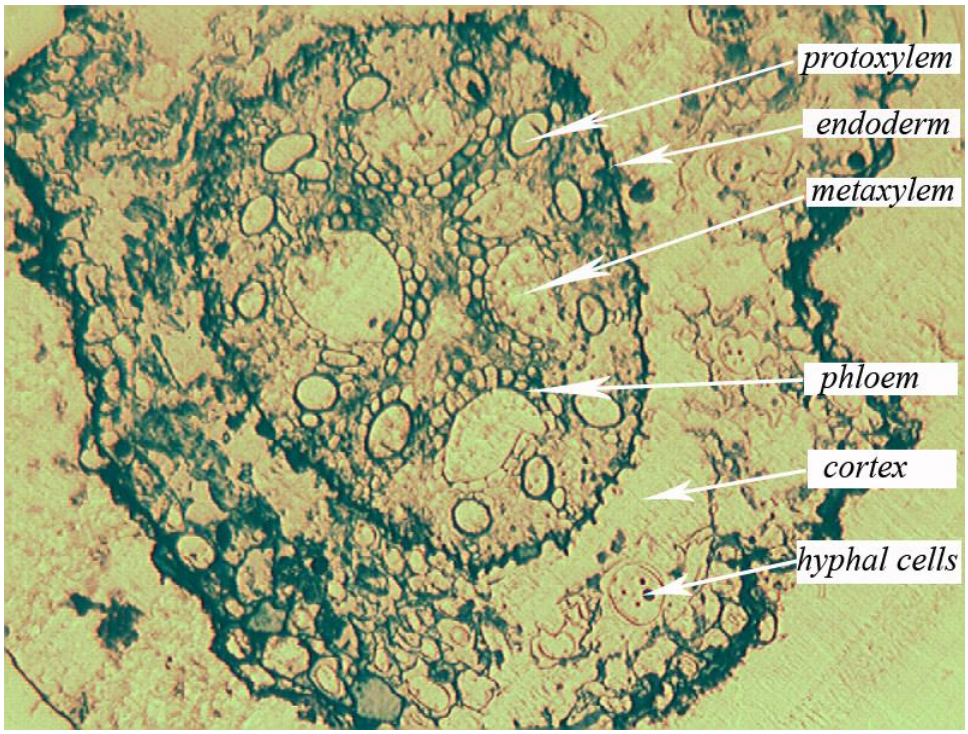

Figure 1.Cross section through the root of *Zea mays* inoculated with *Glomus spp*

In the cortex zone the figure 2 was observed and highlighted which shows that hyphae tightly associate with the host tissue through neelcidated mechanisms, after that they cross the intracellular spaces and then spread itself in the cortical cells, penetrate them, growing in its interior and forming the so called hyphae complexes.

The fungal cells and vesicular arbuscular associations are widespread in the host tissue, where can be observed strongly vacuolated cells containing a dense cytoplasm, others with voluminous nuclei (figure 3), while other cells are highly vacuolated and with signs of advanced senescence (figure 4).

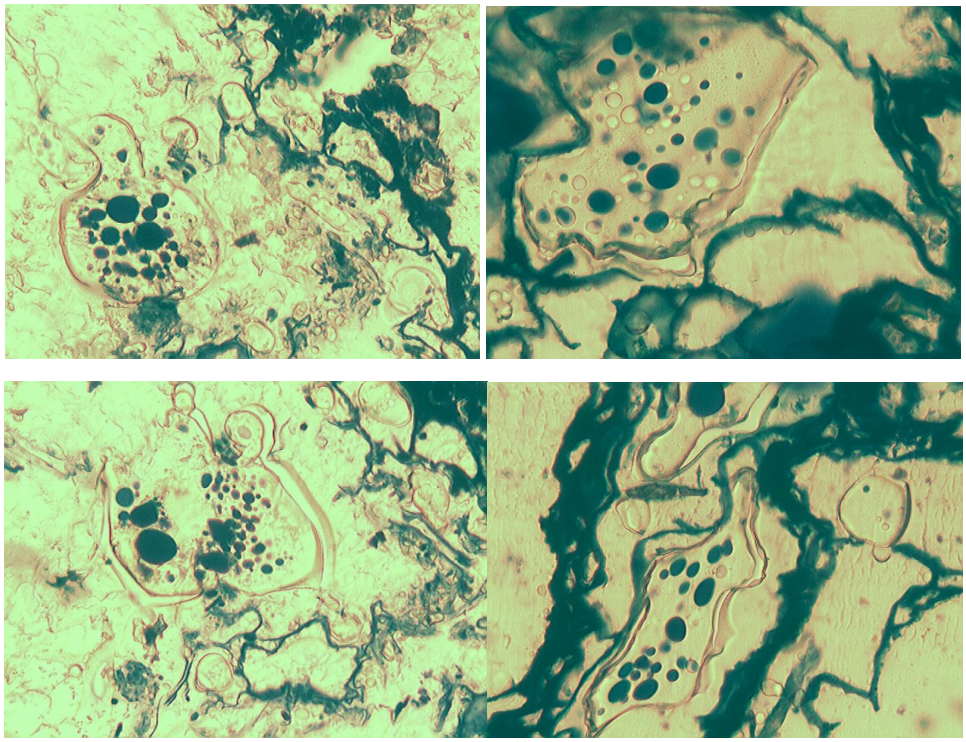

Figure 2. Arbuscular type cells in different stages of development

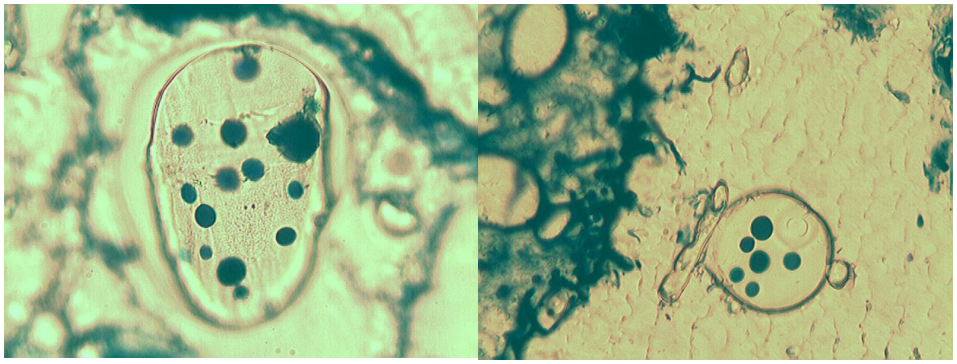

Figure 3. Fungal cells with voluminous cytoplasm and nucleus

In the advanced stages of senescence there were observed, lysis processes or autolysis of the hyphae complexes. There were observed associations with fungal lised cells containing cellular degenerated organelles and with necrotic cytoplasm.

Crossing the cell wall varies according to the anatomy of the root, some hyphae remain in intercellular space, other forms arbuscular structures.

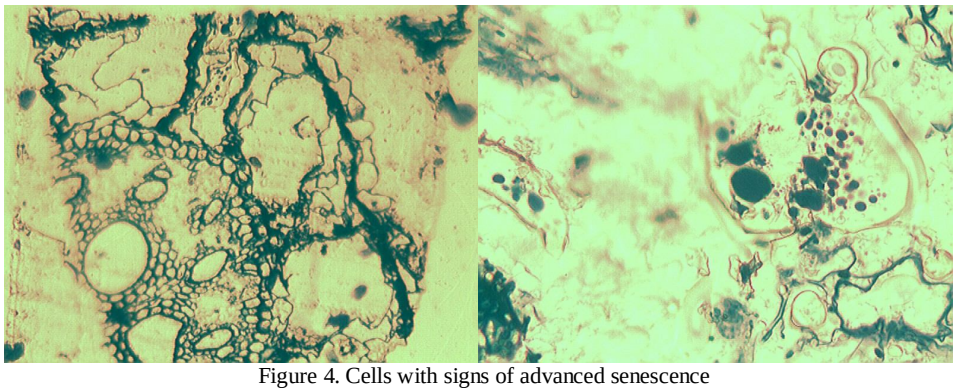

Figure 4. Cells with signs of advanced senescence

Characteristics of vesicular type associations are highlighted in different stages of development at the *Juniperus* species (figure 5) and at the *Spireea biliardi* species (figures 6 and 7), where you can observe how the mycorrhizas fungi hyphae cross cellular spaces of the epidermis forming extra and intra vesicles.

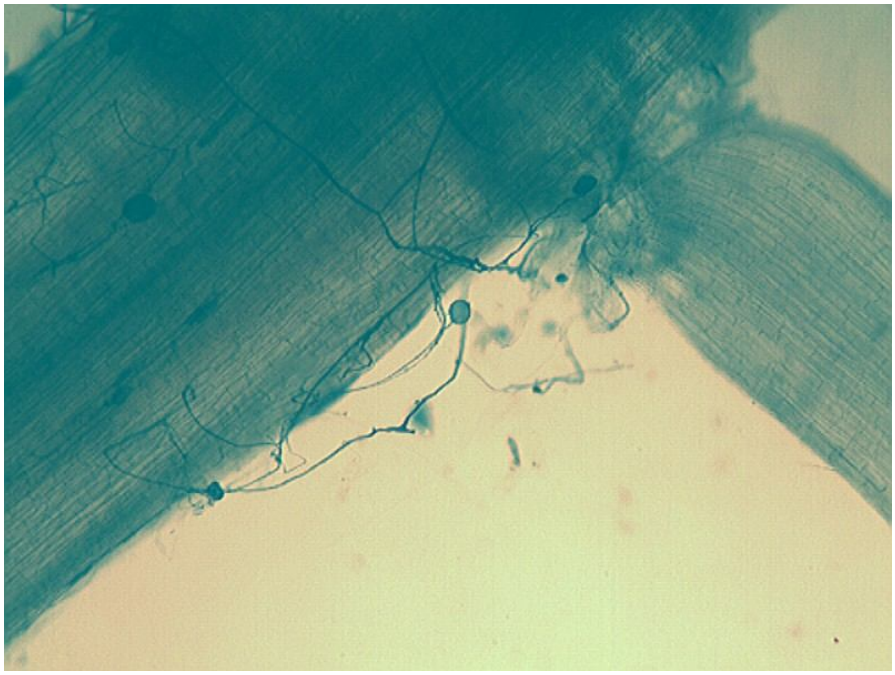

Figure 5. Highlighting of the mycorrhizas fungi from genus *Glomus* by color with blue Pelikan ink (increased from X 200) to the *Juniperus scapul* species

In the figure 8, septated hyphae can be seen entering the cortical cells where they form associations of vesicular arbuscular type in different stages of development and where the cortical cells are occupied entirely by arbuscular mycorrhiza type at the *Pennisetum alopecuroides* species.

Figure 6. Highlighting of the mycorrhizas vacuoled fungi from genus *Glomus* by Pelikan ink blue color (increased by X) to the *Spireea biliardi* species

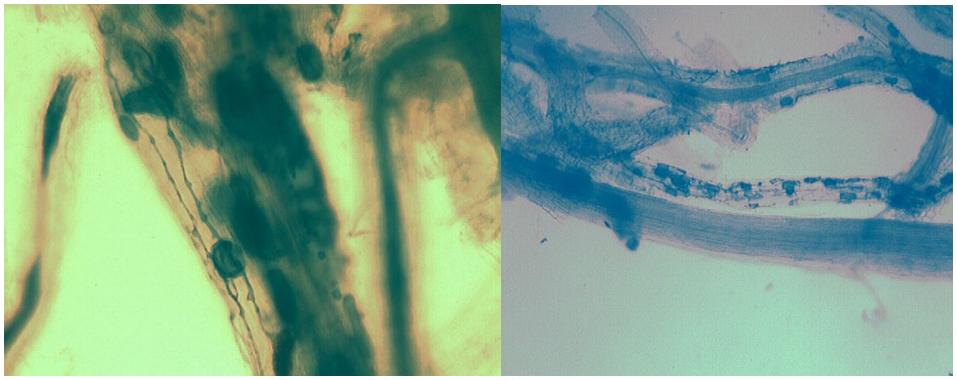

Figure 7. Highlighting of the vesicles and hyphas from genus *Glomus* by Pelikan ink blue color (increased from X 200) the *Spireea biliardi* species.

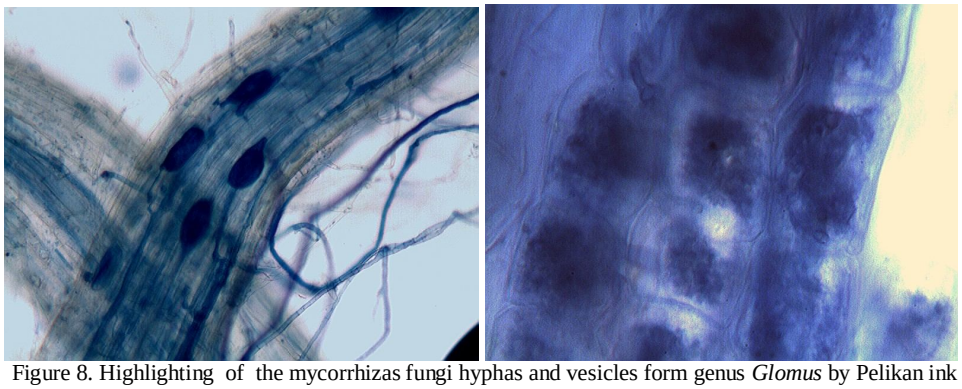

Figure 8. Highlighting of the mycorrhizas fungi hyphas and vesicles form genus *Glomus* by Pelikan ink blue color (increased from X 200) to the *Pennisetum alopecuroides* species

CONCLUSIONS

Following research we can observe:

-after the inoculation with mycorrhiza from the genus *Glomus*, the hyphae are closely associated with the host tissue

-plant cell invasion is made by penetrating of the cell wall and a lesser extent by the spreading from one cell to another

-in cross-section to the roots of *Zea mays* in advanced stage when the host cell is colonized, it can be seen a degenerative phenomenon both to the host cell and the fungal cell, through a process called lysis or autolysis

-the arbuscular mycorrhiza type form a large contact area between fungi and plants, facilitating the exchange of metabolites

-to the species: *Juniperus scapul*, *Spireea biliardi* and *Pennisetum alopecuroides* are highlights the presence of numerous vesicles.

-in the area where the fungus penetrate the host cell can be seen the septation of the hyphae.

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