Abstract

Arbuscular mycorrhizal (AM) fungi are globally distributed soil microorganisms that affect a range of ecosystem functions. They form a close symbiotic relationship with plants, whereby the hyphae of AM fungi penetrate the primary cortex of the host plant and develop the intraradical mycelium. Here they can form richly branched structures called arbuscules. Through these structures, an intense exchange of material, energy and information takes place between the two symbionts. They can also form so-called vesicles in the host cells, which appear to have a storage function. The colonising capacity of AM fungi and the characteristics of their mycelium are largely influenced by biotic and abiotic environmental factors such as the type of host plant, the presence of other soil microorganisms, the availability of phosphorus, nitrogen and water, and the pH of the soil.

The main objective of this study was to describe the dynamics of mycelial development of selected AM fungal isolates, its variability depending on the host plant and nitrogen availability in the cultivation substrate. For this purpose, two containerized greenhouse experiments were conducted to investigate the dynamics of development of four AM fungal species, colonization of different host plant species and the effect of nitrogen availability in the culture medium as a selected soil factor on the growth of extraradical and intraradical mycelium. In the first experiment, four host plant species with different physiological characteristics were selected - *Bromus erectus*, *Medicago sativa*, *Plantago lanceolata* and *Sorghum bicolor*. The established experiment was evaluated in four sampling periods of four, eight, twelve and eighteen weeks to describe the development of AM symbiosis over time and the structure of the intraradical mycelium of different AM fungal species. The second experiment monitored the colonization of roots and soil by AM fungi in symbiosis with *P. lanceolata* on a nitrogen gradient in the culture medium.

In the first experiment, the dynamics and structure of AM fungal colonization varied among isolates and depending on the host plant species. In the second experiment, nitrogen concentration had a significant effect on the construction of extra- and intraradical mycelium, but the growth optimum of the two structures was different. Extremely low nitrogen levels had a positive effect on intraradical colonization and a negative effect on extraradical colonization. Extremely high nitrogen levels resulted in inhibition of both intra- and extraradical mycelium in all isolates except *R. irregularis*. The results contributed to a deeper understanding of the variability of AM fungal properties in relation to changes in abiotic and biotic factors.

Klíčová slova: arbuscular mycorrhizal fungi, traits, mycelium, mycorrhiza, extraradical mycelium, intraradical mycelium