

## Effect of Different Fungal Associates on the FT Raman Spectral Characteristics of Norway Spruce Needles

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Norway spruce (*Picea abies* (L.) Karst.) dominates European forest ecosystems. Survival and performance of spruce trees strongly depend on the belowground fungal web involved in nutrient cycling, rock weathering and multiple trophic chains. Ectomycorrhizal fungi are able to influence levels of photosynthetic pigments and nutrients in needles of coniferous hosts. FT Raman spectroscopy is a method that make possible analyses of Norway spruce needles performed both *in vitro* and *in vivo* [1, 2]. In this study we used FT Raman spectroscopy to evaluate effects of several ecologically relevant groups of fungi on the composition of important compounds of spruce needles (waxes and carotenoids).

Aseptically germinated seedlings were planted in systems containing sterilized litter needles and inoculated with either individual fungi or combination of two fungal strains from different groups. Representatives of three ecological groups of fungi were used: saprotrophic (S, M1), mycorrhizal (M2, E2) and endophytic (E1). The seedlings without inoculation (K) were used as a reference. Systems were cultivated in a growing chamber for six months. Fresh needles were cut from each of the seedlings and two spectra were recorded per needle. 24 spectra represented one group of seedlings. The same number of spectra was collected for needles from natural forest area in Šumava mountains (NPŠ). The spectra were evaluated using principal component analysis (Fig. 1) and SIMCA modeling. Significant differences among models were observed. The effects of individual fungal types and various combinations can be related to contents of carotenoids and waxes in corresponding needles.

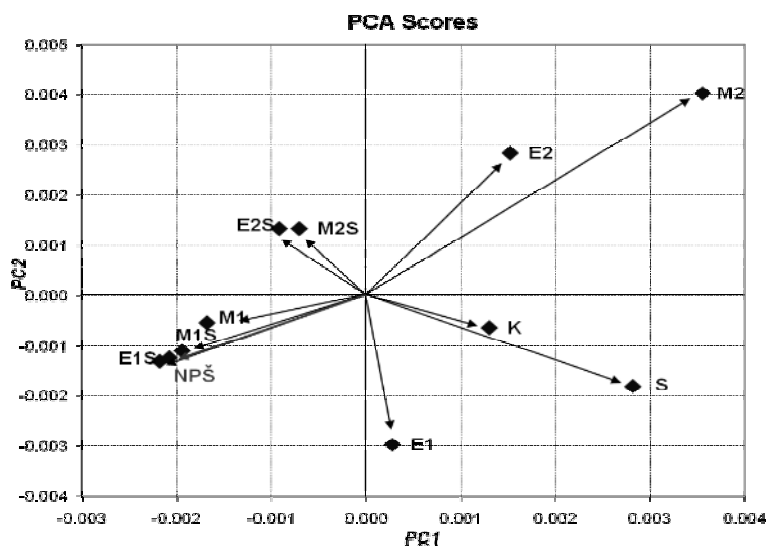


Fig. 1: Comparison of Raman spectral models obtained for individual fungal types

[1] P. Matějka, L. Plešerová, G. Budínová, K. Havířová, X. Mulet, F. Skácel, K. Volka, J. Mol. Struct. 565-566 (2001) 305-310.

[2] P. Matějka, H. Tokárová, T. Pekárek, K. Volka, J. Mol. Struct. 661-662 (2003) 333-345.

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