

Ectomycorrhizal sclerotia formation and status of organo-mineral complex aluminum in low pH *Fagus* forest

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Sclerotia of ectomycorrhizal fungus *Cenococcum geophilum* are preserved in soils with *Cenococcum mycorrhizae*. [1] Ferricrocin is known as an ectomycorrhizal siderophore of *Cenococcum geophilum*. [2, 3] In our previous studies, we reported a characteristic concentration of aluminum in sclerotium and the relationship between aluminum (plus iron) content in sclerotia and active aluminum and iron in soils. [4, 5] Absorption of aluminum and iron may be an evidence of activity of *C. geophilum* associated with its siderophore. This fact harmonizes with microbial dissolution of aluminum and iron from minerals studied on ectomycorrhizal fungus. [6] In this study, we established 10 × 10-m quadrat beneath the *Fagus* forest in northeastern Japan, and then subdivided the plot using a 2 × 2-m grid. Thirty six surface soil samples were collected at each grid node.

The SEM-EDX observation (JSM-6610LV, JEOL) on distribution of elements in a cross section of soil aggregate including a sclerotium showed a slight accumulation of aluminum on soil surrounding sclerotium (Fig.1).

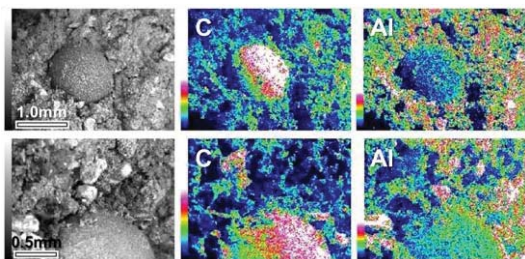


Figure 1: Distribution of C and Al in a cross section of soil aggregate including a sclerotium by SEM-EDX analysis.

According to the analytical results of the sclerotia content, and the status of aluminum in soil (dithionite-citrate, oxalate, pyrophosphate, ammonium acetate, and water extractable aluminum), we discuss the interaction between sclerotia formation and the status of soil aluminum. Furthermore, the interaction between soil and ectomycorrhizal activities in the investigated forest soils are noted regarding with micro topography, *Fagus* stands and floor vegetation.

[1] Trappe (1964) *Lloydia* **27**, 100-106. [2] Haselwandter & Winkelmann (2002) *BioMetals* **15**, 73-77. [3] Hoffland et al. (2004) *Front. Ecol. Env.* **2**, 258-264. [4] Watanabe et al. (2001) *Soil Sci. Plant Nutr.* **47**, 411-488. [5] Sakagami et al. (2007) *Proc. OMD 2007*, 402-403 [6] Watteau & Berthelin (1994) *Euro. J. Soil Biol.* **30**, 1-9.

Spectroscopic studies on sedimentary organic material

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Introduction

Sediment samples from the Saronicos gulf, belonging to the Aegean Sea, were studied for the characterization of humic substances (HS) and dissolved organic matter (DOM). HS are significant sediment constituents performing in metal and toxic material scavenging and transport. Infrared and fluorescence spectroscopy were applied. DOM corresponds to the most active and mobile form of soil organic matter and the major soluble component of natural aquatic systems, with significant functions in the ecological and environmental system. DOM was studied by fluorescence spectroscopy.

Results and discussion

Spectroscopic methods on HS: The application of IR spectroscopy gives spectra with the characteristic peaks for hydroxyl, methyl, methylene, aromatic bond, carbonyl, carboxyl, phenol, alcohol, polysaccharide and silicate impurities. Conventional fluorescence spectroscopy [1] provides with emission spectra with maximum emission intensity at 415-427nm, excitation spectra with a major excitation peak at 355 to 330nm, and synchronous-scan excitation spectra with a very structured form; suggesting the presence of humic-like material with a marine origin.

Spectroscopic methods on DOM: Mono-dimensional emission spectra reveal one typical broad peak with a maximum between 442 and 439 nm. Excitation spectra show three peaks or shoulders at 330 nm, 351 nm, 377-381 nm, and a shoulder at 440 nm. Synchronous scan excitation spectra show one strongest peak at 340-345nm and another much lower or lower intensity peak or shoulder at 385-387nm. Therefore, it seems that fulvic acids, aquatic humic acids and natural organic matter are present. Higher humification index [2, 3], related to a more condensed nature, corresponds to areas with weaker seawater circulation [4]. Excitation/emission matrix spectra (EEMS) exhibit the peak M [5] corresponding to the marine humic fluorophore, strongly correlated with biological activity

[1] Senesi et al. (1991) *Soil Science* **152**(4), 259-271. [2] Ohno (2002) *Environ. Sci. and Technol.* **36**, 742-746. [3] Zsolnay et al (1999) *Chemosphere* **38**, 45-50. [4] Luciani et al. (2008) *Mar. Environ. Res.* **65**, 148-157. [5] Sakellariadou (2012) *IJOO* **6**, 27-43.