Program: Biophysical chemistry

Study form: full-time study

Title: Dissolved organic matter in soils – biocolloidal approach

Tutor: prof. Ing. Miloslav Pekař, CSc.

Soil organic matter, in a narrower sense, humic substances, has been subject of research for several centuries. Nevertheless, questions on its formation or character still have not been resolved. The traditional polymer theory seems to be replaced in the last two decades by supramolecular views, lately claims on the non-existence of the humic substances have become rampant, looking at the soil organic matter as a complex mixture of products at various degrees of the decomposition of decaying original plant or animal matter. Further, it can contain also metabolic products of the soil microorganisms. Dissolved organic matter is crucial for (nutrients) uptake by plants and their development and growth. This matter is rather overlooked in the ongoing discussion that is focused more on solid soil matrix or its traditional isolates – the humic and fulvic acids. After additional but in-depth literature search, the PhD study will be focused on the formation and occurrence of colloidal structures in the soil solution or in the soil aqueous leachates. The study will focus on the aggregation behavior and character of dissolved organic matter, on the size, stability, and diffusion behavior of colloidal structures, possibility to distinguish the supramolecular or macromolecular characters. The study can include also a model study of the colloidal behavior of well-defined molecules which were revealed in soil solutions. Results will be evaluated just from the point of view of the current discussion on the origin, character, and stability of soil organic matter.