

The current state of knowledge about the role of fine roots on the rate of the process of accumulation and enhancing the quality of soil organic matter is based on fragmentary research material originating mainly from non-disturbed ecosystems. Determination of the impact of fine roots and litterfall on sites where the process of soil reconstruction takes place from scratch and sites where organic matter has been exposed to high temperatures, is crucial in the context of soil monitoring and stability. The problem of disturbances in forest ecosystems will continue to be an important factor due to progressing climate changes and widely understood anthropogenic pressure which includes mining. Therefore, the restoration of soil functions in ecosystems through the protection and regeneration of soil organic matter will be crucial. Fine roots and their annual life cycle play a key role in element circulation, mineral nutrition of trees, biosorption of pollutants and accumulation of soil organic matter, and thus carbon sequestration. The current knowledge on the role of fine roots in the dynamics of the process of accumulation and enhancing the quality of soil organic matter is based on fragmentary research material originating mainly from non-disturbed sites. Determination of the impact of fine roots and litterfall on sites where the process of soil starts from scratch and sites where organic matter has been exposed to high temperatures, may provide many valuable answers in the context of monitoring and stabilising soil organic matter.

The research project will determine the role of fine roots and litterfall of various species of forest trees (Scots pine, silver birch and European larch) in the accumulation and diversity of soil organic matter (SOM) in regenerated and reconstructed forest ecosystems. Environmental and soil studies have been planned in field and controlled conditions, including studies of biomass, fine root decomposition rates and litterfall, soil contamination impact on the growth and biosorption of heavy metal elements by fine roots and a study of physicochemical and biological properties of soils. The research results will contribute significantly to cognition of accumulation processes and enhancing the quality of soil organic matter in regenerated and reconstructed forest ecosystems in the context of restoring ecosystem functions of soils and carbon sequestration.