Abstract

Post-mining sites require various reclamation treatments, including topsoil return and afforestation of different tree species. Apart from the type of soil substrate, the tree species selected for reclamation and afforestation determine in different ways the carbon sequestration and glomalin-related soil protein content of reclaimed mining soils. In the context of global climate change, it is important to investigate how tree species functional groups used in the afforestation of reclaimed mine sites affect carbon sequestration and glomalin-related soil protein content in developing novel ecosystem services. Recently, studies in international literature databases on artificial afforestation indicate the important role in carbon accumulation, although there are variations in the amount of carbon accumulation with different tree species. However, there is a lack of data on how the functional group of trees used in mine spoil heap restoration affects the amount of glomalin-related soil protein, which acts as cementing material during aggregate formation and contributes significantly to SOC. The proteins in glomalin-related soil protein can chelate and bind essential nutrients such as nitrogen and phosphorus, making them less prone to leaching and more available for plant uptake. Consequently, research on this vital soil parameter is pivotal for ensuring sustainable ecosystem services. The research project aims to determine the effect of different tree species functional groups reclaimed with topsoiling on carbon sequestration and glomalin-related soil protein in novel ecosystems developed on afforested mine sites. The research results significantly contribute to the identification of tree species functional groups and mechanisms that optimize reclamation processes and the development of ecosystem services (C-sequestration and glomalin-related soil protein). This research is also important in the context of the growing amount of greenhouse gases, particularly CO2 in the Earth's atmosphere.