

Soil biochemical properties and stabilization soil organic matter in relation to deadwood of different tree species

Deadwood is a very important carbon reservoir. During decomposition, C can be transferred to the atmosphere (in the form of CO₂) or it can be added to C stocks in soils where it then becomes a part of the ongoing C cycle. It is estimated that the supplies of carbon in the world soils amount to more than 1500Pg C and are significantly higher than in the atmosphere (750 Pg C) or biomass of terrestrial ecosystems (650 Pg C). Mechanisms responsible for carbon stabilization in soils have received much interest recently due to their relevance in understanding the global carbon cycle. Understanding mechanisms and factors affecting the dynamics of organic carbon in forest soils can be used to reduce climate change. One proposed method to reduce atmospheric carbon dioxide is to increase the global supplies of carbon in soils. The main way in which carbon is stored in the soil is as soil organic matter (SOM). Decomposition of organic matter in soil depends on substance properties and accessibility of microorganisms and their enzymes. We will investigate the enzyme activities which play key roles in the carbon cycle.

The investigation will be carried out in the Czarna Różga reserve, in the Przedbórz Forest District. The fieldwork will include selected dead trees stems and stumps for analysis (four species in different decay classes for dead trees stems and four species in different decay classes for stumps). The following species will be investigated: silver fir (*Abies alba*), common aspen (*Populus tremula*), common alder (*Alnus glutinosa*), common ash (*Fraxinus excelsior*). Additionally we will mapping and measurement of dead trees and stumps, determination of species and decay classes of deadwood. The wood and soil samples will be collected for laboratory analysis. In total 72 samples of wood and 216 samples of soil will be collected. Laboratory analysis will be included the extracting cellulose and determination of lignin content in wood. The physical, chemical and biochemical properties in wood and soil will be determined and the physical fractioning of soil organic matter will be carried out.

Despite the increasing number of studies on deadwood, we still have a limited knowledge of its dynamics. The result of the research will be to determine the size of the stock of organic matter that has accumulated as a result of decomposition of deadwood. Knowledge about the amount of organic matter accumulated in soil at different distances from the deadwood will help determine the extent of the impact of deadwood on the rates of organic matter. We expect to estimate how the mass of deadwood of different species in various stages of decomposition affected the accumulation of soil organic matter and biochemical process and how big was the extent of this impact. We wish to be able to determine the balance between C gain from deadwood and C loss (per 1ha). We would like to specify the species which have a positive effect on soil organic matter stabilization.