The effect of drought on microbial activity and decomposition of deadwood in various temperate forest species

An effect of changes in thermal conditions as well as changes in wind speed and amount of precipitation will be the occurrence of extreme meteorological phenomena, including sudden periods of heavy drought. The global warming may result in changes in the balance between plant production and decomposition and the net mineralization of carbon pools in forest ecosystems. Decomposition is an essential process in forest ecosystem functioning, it plays the crucial role in the breakdown of organic matter recycling nutrients that have been used by plants and animals. An important factor regulating the decomposition process is climate which affects the activity and composition of the microorganisms involved in decomposition process. Under the conditions of a changing climate, knowledge about the impact of drought on the decomposition rate of deadwood in connection with microbial activity is very important because the amount of carbon stored in deadwood is equivalent to about 8 per cent of the global forest carbon stocks. Deadwood is a source of biodiversity and a model for observing natural processes in the forest ecosystems. No study to date has estimated the effects of the drought on decomposition rate of deadwood in connection with the microbial community structure. The main purpose of our research will be to determine the effect of drought in shaping microbial activity and decomposition rate of deadwood in temperate forest. For this purpose a drought simulation system with logs of deadwood will be set up. The proposed approach will explain the impact of drought on the structure of microorganisms (bacteria and fungi) involved in decomposition processes. Our research will allow determining the impact of drought on CO_2 emissions released during the decomposition of deadwood of different species. We will assess deadwood decomposition as the loss of mass for wood samples of locally dominant native tree species (pedunculate oak (*Q. robur*), aspen (*Populus tremula),* common beech (*Fagus sylvatica*), silver fir (*A. alba*), Norway spruce (*Picea abies*) and Scots pine (*Pinus sylvestris*)). The research will complement the knowledge of ecology in temperate forest ecosystems, their biogeochemistry and microbiology. We hope that the better understanding of the mechanisms and factors influencing the decomposition process of deadwood in drought conditions will allow for intentional prediction of these phenomena in the future, which will contribute to the maintenance of forest ecosystems stability. Innovative research methods will be used in the research. We will conduct the field experiment using an innovative drought simulation system. In addition, soil biota studies will be conducted using molecular biology methods - Next Generation Sequencing (NGS).