

Summary

Deadwood is an essential component of forest ecosystems and it plays an important role in maintaining biodiversity. Despite the increasing amount of research on deadwood, we still have little knowledge about the dynamics of the transformation of carbon released from decaying wood to the soil. Soil carbon stabilization is of interest to many researchers because of its importance in understanding global carbon circulation. The main aim of the research was to understand the mechanisms of soil organic matter stabilization as a result of the deadwood impact. The research is an attempt to supplement knowledge about the role of deadwood in shaping physical and chemical properties, especially biochemical activity of forest soils. The research was carried out in the Czarna Różga Reserve, located in Przedbórz Forest District. Four experiments were planned and conducted to achieve the set aims. The obtained results indicate that soil moisture conditions affect significantly the amount of deadwood as well as the storage of carbon and nitrogen in the lying wood of dead trees. A tendency to increase the number of dead trees has been accompanied by the soil moisture increase. The study confirmed the positive effect of deadwood on the forest soils properties. The research has proved that organic matter and mineral substances released from deadwood can stimulate the formation of soil aggregates, increase soil porosity, and shape the retention capacity of forest soils by significantly increasing the number of micropores. The C/N/P stoichiometry has also been shown to be an indicator of the intensity of nutrient flow released from the deadwood into soil. It has been proven that the enzymatic activity of forest soils is strongly stimulated by the components released during the decomposition of wood. Analyses of the fraction of soil organic matter have shown that it can be used to assess the intensity and rate of organic carbon circulation between the deadwood and the soil. Decaying wood significantly increases the carbon and nitrogen content of the fraction of soil organic matter, particularly the strong increase in the light fraction of soil organic matter. The conducted research offered a significant extension and deepening of knowledge about the distribution of carbon, nitrogen and phosphorus in the deadwood – soil system.

Keywords: enzyme activity, deadwood, soil organic matter, degree of deadwood decomposition, soil properties