

## Abstract

The decomposition of organic matter is (next to photosynthesis) one of the key biogeochemical processes responsible for the circulation of elements in nature. Despite many studies devoted to the biomass decomposition in recent years, only few of them concerned this matter on post-mining areas. This research attempts to fill this gap. The aim of the research was to determine the leaf litter decomposition rate of various species in the stands growing on reclaimed post-mining land and adjacent forest areas. It was hypothesized that: (H1) leaf litter decomposition rate of studied tree species will differ in similar environmental conditions, moreover (H2) it will be faster in home and mixed stands than in Scots pine monocultures, and (H3) faster in stands of the same species growing on exposures where higher average temperatures on the forest floor were recorded, while lower (H4) under stands growing on post-mining rather than forest sites. The research was conducted for five years on the external spoil heap of the Bełchatów Lignite Mine (and adjacent forest areas), where a set of 31 experimental plots was established.

In the course of the research it was stated that (ref. H1) leaf litter decomposition rates differed between studied species. These differences were similar to those reported in the existing literature, however, mass losses of particular litter types were at individual stages of the decomposition process relatively smaller. Leaf litter decomposition rates of all species (ref. H2) that were examined in mixed stands and Scots pine monocultures were faster in the former. Comparing the rates of leaf litter decomposition in mixed stands with those in home stands, no similar trends were observed for the species studied. Scots pine stands growing on the western slope of the spoil heap (ref. H3) favoured faster leaf litter decomposition in comparison with the same species stands on its plateau. In the case of home stands, the influence of the exposure was not so unambiguous. Moreover, it was noticed that in both stand types, the decomposition rates in the period from September to June was generally faster on those exposures, where higher temperatures on forest floor were noted. In the remaining months, reverse relations were stated. Comparing leaf litter decomposition rates in different habitat conditions (ref. H4), we stated that they were generally lower on spoil heap than on forest sites. Some exceptions were noted only for litter of *A. glutinosa* and *B. pendula* under Scots pine stands, where the relations were opposite.

Obtained results are the basis for recommendation the specified tree species and proper forms of their admixtures for afforestation of reclaimed areas. Due to the specificity of post-mining areas related to high variability of soil substrates, we recommend to increase the share of the majority of the examined tree species in new plantings. Nevertheless, taking into account both the biological and the economic purpose of reclamation, introducing mixed tree stands should be supported as they improve the biological and physicochemical properties of soils in degraded areas.