

# RESEARCH OF THE VEGETATIVE COVER OF ABANDONED COAL DUMPS

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Abandoned coal dumps have various chemical and mineralogical compositions. Under the influence of internal and external physicochemical processes in combination with climatic and hydrogeological conditions, the chemical composition of the dumps undergoes serious transformations. This can lead to the inhibition of growth and death of plants that grow on the dumps and adjoining areas. Therefore, the control of the state of phytomeliorants growing on waste heaps is an important link to the rehabilitation of the mining territories.

Research of the vegetation cover was carried out on the territories adjacent to the abandoned coal dumps in one of the largest mining regions of Western Ukraine, namely in the Chervonohrad mining area, where coal has been mined for over 50 years. For the research there were selected 5 test sites with dimensions of 20 m × 20 m. As a control site the village of Volytsia (Sokal District) was selected. This village is being not affected by mining operations.

The toxic impact of the dumps on the condition of trees and shrubs was assessed using a technique that comprises measuring biometric indexes of trees growing within the selected test sites. The thickness of tree trunks at a height of 1.3 m and their height were measured. Besides, the morphometric approach was used in order to investigate the level of fluctuating asymmetry (FA) for *Pinus sylvestris* L. and *Betula pendula* Roth.

The best growth indexes for *Betula pendula*, *Populus tremula* L., *Pinus sylvestris*, *Robinia pseudoacacia* L., *Salix caprea* L. were established at the dump base in contrast to the top of dumps where significant deflationary processes were observed resulting in appearance of dip gullies with the width 2–4 m and depth 1–3.5 m.

There were measured the length, width and thickness of fir-needles, as well as the length of two paired needles. As a result of the conducted research, it was found that the diameter of coniferous trees was within the range of 0.12–0.35 m, while the height was 0.4–1.1 m. It should be noted that within the test sites located close to mines the height of trees was less than at the control site. The smallest length of needles was found at the 1<sup>st</sup> test site located in the zone of impact of the mine waste dumps. A similar situation was observed for such indexes as the width and thickness of the needles. The highest values of these indexes were found at the control site. The FA indexes at the 1<sup>st</sup> and 2<sup>nd</sup> test sites 2.5–3.5 times exceeded those at the control site.

The results of evaluation of *Betula pendula* FA indexes showed negative impact of the mine waste dumps on the state and development of leaves compared to the control site. The FA index (average values) for samples growing on the mine waste dumps 2.3 times exceeded the comparable values at the control site. According to the FA indexes, the smallest score (I) was received at the control site, such values characterize the quality of the environment as "conditionally normal". The FA indexes values in different parts of the heap varied, resulting, however, in the highest score (V) that characterized the quality of the environment in the mine waste dumps area as a "significant deviation from the norm".

The assessment of the vegetation cover of the mine waste dumps allows determining the resistance of certain plants to the impact of toxic elements. Besides, there was substantiated a list of phytomeliorants with the highest resistance to specific conditions that can be the basis for phytoreclamation and eventually reduce the negative impact of the mine waste dumps in general on the environment.

**Key words:** Coal Dumps, Vegetation Cover, Phytomelioration, Bioindication