

APPLICATION OF BIOTECHNOLOGICAL METHODS OF VERMICULTIVATION FOR ECOLOGICAL RESTORATION OF MINING SITES

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The issue of land recultivation after the development of mineral deposits is topical. Technozems (technogenically transformed land) formed in the process of recultivation are significantly different from zonal soils by the level of fertility, physical, physicochemical, agrochemical and other ecologically important indicators. Soil-zoological studies indicate depletion of the species composition of soil invertebrates in the areas of recultivation, which does not allow effective functioning of the transformed ecosystems. An important aspect is the restoration of natural ecosystems on the territory of mining regions. Very important scientific and practical aim is the study of the possibilities of using biotechnological methods of vermiculture in areas of biological recultivation by disturbances in the mining industry of lands.

The purpose of our research was the scientific substantiation of the application of biotechnology of vermiculture in order to ensure positive changes in the ecological state of technozems with the aim of accelerated restoration of the biotic potential of disturbed biogeocoenoses. The task of our research was to search for technological methods and methods that will help to stop the degradation of techno-systems, to correct the direction of their development towards the soil-forming process, to strengthen the buffer capacity of ecosystems to negative factors.

To restore disturbed biogeocoenoses, it is necessary to create an edaphotope, which must possess the optimal granulometric composition, positive physical, water-air and agrochemical properties. Then an autotrophic part of the biogeocoenoses is formed, which will serve as the basis for the restoration of the heterotrophic block – animal, terrestrial and soil coenoses, as well as microbiocoenoses: bacteria, unicellular algae, protozoa and lower fungi. Soil animals are directly involved in the processes of soil formation, which is important for the fast restoration of the ecological potential of technogenic-transformed lands and creating of full-fledged ecosystems. In our studies, the high efficiency of soil invertebrate (vermiculture) use for restoring the ecological and humus condition of different types of technozems is shown. To study the effect of biotechnology of vermiculture on the soil-forming processes of technozems, studies were carried out of microbiological and agrochemical properties, as well as group and fractional composition of humus of samples of technozems and vermicomposts at different stages of application.

As a result of researches has been established that the introduction of a vermicompost into the soil with proper agrotechnics promotes the restoration of normal soil microflora, increases the total humus content in the soil, makes mineral nutrients more accessible for assimilation of plants, and also slows the process of mineralization of plant residues in the upper soil horizon for account of maximum fixation of humic substances and stimulation of microbiological processes of humification.

The application of biotechnological methods of vermiculture is substantiated and technological methods of introducing vermicompost and population of worms on the sites of recultivation are developed. The measures proposed by us will help reduce the costs of recultivation and improve the recultivation process itself.

The main advantages of the proposed technology for improving the effectiveness of recultivation work with the help of vermiculture: improving the humus and ecological state of technozems, preventing the degradation of technozems. Therefore, the application of biotechnological methods of vermiculture will be useful to accelerate ecological restoration of mining sites.

Key words: Biotechnology in Mining, Vermiculture, Technozems, Recultivation, Accelerated Ecological Restoration