



POLLUTION OF SOILS OF INDUSTRIAL TERRITORIES AND WAYS OF THEIR EFFICIENT CLEANING

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Annotation: The article provides information on soil pollution of the industrial zone as a result of heavy metal emissions. Methods of technical and biological reclamation of polluted soils have also been studied.

Key words: reclamation, industry, pollution, heavy metals, technical reclamation, biological reclamation, phytoremediation, environment.

Today, as a result of the activities of industrial sectors around the world, the ecological condition of our soils is damaged, they are polluted by heavy metals, and in some cases, they become unusable. Especially, as a result of the increasing negative impact of heavy metals from industrial sectors on the soils of the region, changes in the morphological characteristics of the soils are observed. The increase in the amount of toxic chemical compounds, dust, and heavy metals in the soils of the industrial area leads to the deterioration of the ecological condition of the soils. A decrease in soil fertility is observed due to the compounds that are foreign to the soil. This, in turn, has a negative effect on agricultural crops, the yield of crops decreases, heavy metals accumulate in crops and enter the human body with food products, and various infectious diseases occur in humans. and causing chronic diseases.

Soil microflora is considered the main factor in the circulation of substances, which leads to the destruction of organic substances in the soil, changes in the ratio of groups and numbers of microorganisms, biogeochemical processes in the soil, changes in the soil [2]. The chemical condition of the soils of industrial zones due to the acceleration of production, as well as the diversity of man-made sources, the



active addition of metals to biochemical migration processes and their toxicity to living organisms, soil contamination with heavy metals has become a global environmental problem [8].

A number of foreign scientists have conducted scientific studies on the study of factors that cause changes in the environment, including the morphological characteristics of soils and the ecological state of industrial sectors. In particular, during the period 1993-2017, during the study of the regions in the north of Western Siberia, due to the influence of oil and gas enterprises, heavy metals such as Cu, Zn, Ni, Co, Fe, Mn, Cr, Pb, Hg, Cd, High concentrations of Ba, Sr and Sc were detected [3]. The amount of heavy metals in the man-made damaged soils as a result of the activities of the industrial sectors of Ukraine was monitored during the years 2002-2003, 2007-2008, 2012-2013, and the presence of heavy metals in the soil was determined. This showed the man-made pollution of the soil as a result of the industries [4]. Industrial pollution of soils with heavy metals is increasing all over the world. As we know, there is a decrease in the growth, productivity and yield of plants growing in polluted soils [5]. Through the analysis of soil pollution, industrial enterprises made it possible to determine the level and characteristics of environmental pollution [6]. Industrial enterprises are an integral part of the infrastructure of cities, at the same time they contributed to the unfavorable environmental situation in the city itself and even outside it [7].

When soil samples were collected from industrialized areas in Jiangsu Province, China, when the heavy metals Cd, Pb, Cr, Cu, Zn, Hg and As were examined in the soil, the content of Hg, Cd, Pb, Cr, Cu and As was higher than REChU shown by [1].

As a result of soil pollution, the state of the environment and the health of the population of the region are deteriorating. Various harmful substances and toxins in the soil microflora increase the spread of anxiety and various diseases among the population. The harmful effects of such substances have had a significant effect on the elderly and young children.

Research results:

Heavy metals released into the environment as a result of industrial activities remain in the soil for a long time, depending on the type of metal. The reclamation measures used to clean the soil from heavy metals consist of technical and biological methods, and the use of these methods gives good results.

Technical reclamation. In order to reduce the harmful effects of soils contaminated with heavy metals on the environment, recultivation occupies an important place as the main direction of their exploitation. It is advisable to organize



technical reclamation works on such lands. Technical recultivation consists in removing the surface layer of contaminated soil and removing the fertile soil layer as a result of technical works. After that, the process of recultivation is carried out as a result of filling this technological horizon with fertile soil. In this case, the upper damaged layer of contaminated areas is removed and leveling is carried out using special techniques. Then a layer of fertile soil is brought to the prepared area and filled and leveled. After a certain settling time of the potentially fertile layer, the fertile soil layer is applied and the final leveling is carried out.

Biological reclamation. In soils contaminated with heavy metals, the renewal of natural plant cover, the germination of newly planted plants is very slow, therefore, cultural phytocenoses that create conditions for the restoration of the plant community should be planted selectively depending on the type of heavy metals contained in contaminated soils. need Phytoremediation is a new technology based on the use of plants to remove pollutants from contaminated soils. The selected plant species serve to extract organic pollutants from the soil and collect them in cell compartments. By planting such plants as *Medicago*, *S.nigra*, *Diarthronvesiculosum*, *Hibiscus cannabinus*, the heavy metals Cd, Zn, Ni, Cr, Pb and Cu in the soil can be removed by the above plants themselves. collects and cleans.

The method of bioremediation of soils contaminated with heavy metals is based on reducing the damage of heavy metals in the soil using fungi, bacteria and green plants, and is carried out using 2 types: natural attenuation and protection methods. The plant *Aspergillus welwitschiae* is recommended for remediation of soils contaminated with heavy metals. The most important advantage of this technology is their safety for the environment: they are based on the self-cleaning processes of living nature, and there is no secondary waste generated by other methods. In addition to plants, the use of microorganisms such as *Fusarium*, *Alternaria*, *Aspergillus*, *Mucor*, *Penicillium*, *Verticillium* *Azotobacter* *Bacillus* and *Xanthomonas* for bioremediation has good results.

Summary. The growing population is increasing the demand for natural resources, and as a result, the harmful effects on the air, water and soil are increasing. Heavy metals that are released into the environment under the influence of industrial sectors fall directly into the soil through atmospheric air and water. As a result, heavy metals accumulate in the soil, leading to man-made pollution. Later, as a result of planting plants on contaminated soil, these heavy metals enter the plant body and have a harmful effect on humans through food products. As a result, the human nervous system is affected, phosphorus-calcium metabolism is disturbed, chronic



poisoning, anemia, bone destruction, liver damage, lung dysfunction, osteoporosis, skeletal deformation, hypertension, and kidney stones are caused. cause. In this regard, it is very important to study and protect the ecological condition of soils for the safety of people and food.

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