BIOMONITORING THE SPREAD OF OIL PRODUCTS IN CONTAMINATED SOILS

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Almost all elements of the environment are influenced by human actions, and this is especially noticeable in the fuel and energy industries. One of the most vulnerable parts of the environment is the soil. It easily absorbs harmful substances, and even small amounts of pollution can have a long-term impact. When soil is contaminated, it disrupts the balance of local ecosystems, reducing both plant and animal populations. A major source of such pollution comes from toxic substances, with oil and oil products posing some of the most serious threats. These materials not only persist in the environment for a long time but also spread quickly, making cleanup difficult and harming biodiversity in affected areas. Oil products are absorbed in the upper layers, reducing soil porosity and water permeability, and an oil film can form on the surface, which causes greater heating. The roots of plants are covered with oil compounds, which reduces the supply of moisture and nutrients.

Once in the soil, oil products migrate in vertical and horizontal directions, distributed unevenly. The highest concentration of oil compounds is observed at the depths of 0-10 cm and 30-40 cm, and it is half as high at the depths of 10-30 cm. immediately after the oil gets in, the self-cleaning process begins. Its intensity depends on air humidity, soil type, the amount of oil that has entered the soil, and the presence of microorganisms that accelerate this process. Destructive microorganisms can exist in contaminated soil or be added by isolation from other contaminated areas. They are resistant to the toxic effects of oil products. The most common oil-oxidizing organisms in the soil are bacteria of the genera Rhodococcus, Pseudomonas, Arthrobacter, Mycobacterium and others. For their better activity, it is advisable to combine several different strains, and under favourable conditions (temperature, humidity, soil acidity, aeration) they can utilize a fairly large amount of oil that has entered the soil.

To assess the toxicity of the environment and for the purpose of biomonitoring, bioindicator organisms can be used that can exist only at a certain level of pollution. They can be plants and representatives of micro- and mesofauna. Restoration of background soil parameters after remediation is possible only after 8 years. The use of biological soil treatment is more promising than mechanical, physical and chemical methods, as it requires lower financial costs and has a longer-lasting effect.

It is advisable to restore contaminated soils after 45 days using phytoremediation methods, planting plants to a depth of 10 to 20 cm. For biomonitoring of remediated soils contaminated with oil products, it is best to use bioindicator organisms. So, it was analyzed the processes of oil product migration in soils and proposed to use soil organisms as bioindicators.