

*Materials of Conferences***BIORECUltIVATION
OF OIL-CONTAMINATED SOILS
OF SOUTH KAZAKHSTAN**

Issayeva A.U., Rysbayeva G.A., Uspabayeva A.A.,
Eshibaev A.A.

*South Kazakhstan State University
named after M. Auezov, Shymkent,
e-mail: Galia732007@mail.ru*

The research has been conducted in the territory of «PetroKazakhstan Oil Products» LLP, where total content of oil products on local oil-contaminated areas varies from 1,23 to 25,56 g/100 g of soil. In these soils the content of humus is 1,6–1,8%, total nitrogen N – 0,146%, labile P₂O₅ – 38 mg/kg of soil. Acute toxic action of oil and oil products is showed as a sharp drop of breathing of oil-polluted soil and activity of soil ferments that became especially evident when oil and oil product concentration has increased. In the course of studying of oil hydrocarbons biodestruction it has been found out that hydrocarbon-oxidizing bacteria, which are isolated from oil-contaminated soils and selected, influence on qualitative composition of oil hydrocarbons. 1-butylbenzene, 1,2-ethylbenzene, prehnitene, naphthalene, phenanthrene, anthracene undergo complete biological destruction.

«Peroil» preparation has been developed on the basis of *Micrococcus luteus* B1Ag8G and *Rhodococcus erythropolis* DP 304-B7 strains. This preparation allows cleaning the soil from oil and oil products up to 91,7% within the period from 1 to 6 months.

In order to make it possible to re-utilize oil-contaminated territories, *phytoremediation* stage, using oil-tolerant species of plants, and *vermiculturing* stage, using earthworms, are recommended to be included in biorecultivation works cycle in the conditions of South Kazakhstan.

Phytorecultivation technology implies the following activities: plowing of soil up to 30–40 cm depthward, seeding of oil-tolerant plants, such as creeping finger grass (*Cynodon dactylon*) and common reed (*Phragmites australis*), in quantity of 15–20 g/m² at oil concentration in the soil of up to 5,0%. In order to provide a nutrition to plants and spontaneous rhizosphere microbial flora, 1,0% ammophos is to be applied. Additional introduction of active strains of hydrocarbon-oxidizing microorganisms allows enhancing cleaning degree to 97,3%.

Oil products have not been detected in cleaned soils after use of vermiculturing, as a last stage of biorecultivation works. At the same time the content of humus in loamy gray soils has achieved the value of 1,9%, in gray-brown soils – 0,8%, mountain light-brown soils – 2,7%, mountain dark-brown soils – 4,8%.

In summary, depending on conditions of oil contamination of substrates, weather and climate conditions in South Kazakhstan region, biorecultivation technologies shall vary in wide range of biotechnological capabilities, including, stepwise, the stages of microbiorecultivation, phytoremediation and vermiculturing.

Reference

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