

Diversity of Culturable Forms of Microorganisms in Soils with Long-term Exposure to Petroleum Hydrocarbons and Prospects for Bioremediation

Authors : Yessentayeva K. Y., Berzhanova R. Z., Mukasheva T. D.

Abstract : The purpose of this study was to study the microbial diversity of soils with long-standing hydrocarbon pollution in the S. Balgimbayev field (Kazakhstan), where the transformation of meadow coastal soils technogenic solonchak soils, as well as the assessment of the degradation potential of microorganisms perspective for the use for bioremediation. In the present work autochthonous microorganisms of the surface horizon of soils were investigated. In samples with a low degree of pollution the number of microorganisms, was comparable to the number in the uncontaminated soil and was 10³ - 10⁴ CFU/g. and one and two orders of magnitude lower in samples with high oil content. A collection of microorganisms was created using different culture media, which made it possible to isolate isolates that play a key role in different successional stages of biodegradation of petroleum hydrocarbons. The collection included the main bacterial filaments, Protobacteria, Firmicutes, Actinobacteria and Bacteroidetes. Mycelial fungi and yeast-like fungi were assigned to the Ascomycota division. Studies showed that the percentage of isolates capable of growth in hydrocarbons varied. More than 50 % of the isolates grew on crude oil, a low percentage of less than 10 % of the isolates grew on an anthracene, phenanthrene and naphthalene, more than 20 % of the isolates belonging to different genera *Pseudomonas*, *Bacillus*, *Rhodococcus*, *Achromobacter*, *Gordonia*, *Microbacterium*, and *Trichosporon*, characterized the growth on two or three different hydrocarbons. The ability to grow using all hydrocarbons, associated with the synthesis of biosurfactants, was detected only in a few isolates.

Keywords : oil, soil, number of bioremediation, biodegradation, microorganisms, hydrocarbons - oxidizing microorganisms

Conference Title : ICSBB 2024 : International Conference on Soil Biology and Biochemistry

Conference Location : Nicosia, Cyprus

Conference Dates : April 25-26, 2024