METHODOLOGICAL APPROACHES TO THE STUDY OF MICROBIAL LANDSCAPE OF SOIL

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The study is devoted to the main methods research of soil microflora. Microscopic and cultural methodsare used in most researches. Now much attention is paid to metagenomic technologies.

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The term microbial landscape was introduced by S. I. Vinogradsky to characterize the microbial biocoenosis of the soil. It includes information on the number of microorganisms, their species composition, numerical and spatial relationships of microbial populations.[1] Microflora is represented by a known group of microorganisms: spore-forming and nonspore-forming bacteria, actinomycetes, microscopic fungi, spirochetes, archaebacteria, protozoa, blue-green algae, mycoplasma and viruses.

There area huge number of techniques for the study of microbial biocoenosis. They are mainly aimed at the detection and accounting of microorganisms in the soil. The essence of these methods consists ofdirect microscopy of the soil sample using light, electron and luminescent microscopy, andbacterial inoculation into solid medium and culture fluid. Also methods use for study the ecological functions of soil microorganisms. These methods are aimed at identifying microorganisms involved in the conversion of carbon compounds, nitrogen, phosphorus, sulfur, iron and manganese. The above methods are classical in the study of soil microorganisms and allow to take into account not only the number but also the taxonomic composition of the complex of soil microorganisms. [2] It is possible to allocate from the isolated colonies growing on cups with a nutrient medium pure cultures of microorganisms for further research and identification. The possibility of biological methods of accounting for soil microorganisms is limited in the sense that it is impossible to offer an environment that ensures the growth of all microorganisms. Not all microorganisms can be cultivated. And for electron and luminescent microscopy sample preparation for the study process is very time-consuming.

For the most complete disclosure of ecological and service functions of soil microbiome it is proposed to combine methods of metagenomics (for evaluation of phylogenetic diversity of microorganisms), analysis of biomarkers (to determine functional diversity) and measurement of enzymatic activity (to assess the actual functionality of soils).[3] Due to metagenomic methods in soil microbiologystudy of not only cultivatedwell known species of microorganisms, but also non-cultivated bacteries. The biological properties of which can be judged solely on the basis of genetic information encoded in their DNA.[2,4] Metagenomics can be used to improve strategies for monitoring the effects of pollutants on the ecosystem, as well as to develop new methods for cleaning up contaminated media [4].

Do not forget about that the type of soil, its fertility, humidity, aeration and physical and chemical properties affects the qualitative and quantitative composition of soil microflora. Human activity affects on the microbiocoenosis of the soil: tillage, fertilization, reclamation, pollution of waste production. The development of an optimal methodological approach in the study of soil microbiocoenosis will not only provide information about the quantitative composition, but will give a deeper understanding of how microbial communities cope with pollutants. And that can be used to control of technogenic pollution.

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