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Some Features of the Microbial Communities in Urban Soils

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ABSTRACT

The distinctive feature of urban soils is contamination with heavy metals, petroleum products, xenobiotics and other pollutants. The transformation and neutralization of these substances depend on the state of environmental microbes. Microorganisms react most sensitively to changes in environmental conditions. Certain groups of microorganisms are able to adapt to certain environmental conditions and resist the toxic effects of pollutants. The purpose of this work is to study the composition of bacterial communities in urban soils under conditions of various types of pollution and their ability to synthesize silver nanoparticles. The soil samples used in this work were taken in the immediate vicinity of the «A-100» gas station in Minsk, Minsk Heating Equipment Plant, the Minsk Ring Road, and a company «Belgazstroy». As a result of studies, it was established that the soil microbiota is represented by 7 genera of bacteria belonging to 6 families: *Pseudomonadaceae* (*Pseudomonas* sp., *Azotobacter* sp.), *Micrococcaceae* (*Arthrobacter* sp.), *Streptomycetaceae* (*Streptomyces* sp.), *Nocardiaceae* (*Rhodococcus* sp.), *Enterobacteriaceae* (*Escherichia* sp.), *Bacillaceae* (*Bacillus* sp.) and 7 genera of micromycetes belonging to 6 families: *Aspergillaceae* (*Aspergillus* sp., *Penicillium* sp.), *Debaryomycetaceae* (*Candida* sp.), *Hypocreaceae* (*Trichoderma* sp.), *Nectriaceae* (*Fusarium* sp.), *Pleosporaceae* (*Alternaria* sp.), *Sporidiobolaceae (Rhodotorula)*. It has been suggested that under the influence of anthropogenic load, biodiversity of soil mycobiota is decreasing in the studied soils. It should be noted that the number of microorganisms in the analyzed soil samples also reduced ($8{,}5{,}0\times10^3$ – $7{,}0\times10^6$ CFU/g dry soil). These microorganisms have been tested for their ability to synthesize silver nanoparticles. 16 most active cultures, belonging to the genera *Aspergillus*, *Penicillium*, *Fusarium*, *Rhodotorula*, *Pseudomonas*, were selected, based on microscopic and spectrophotometric analysis. They were characterized by the maximum level of formation of silver nanoparticles. UV-visible spectra of crop filtrates showed absorption characteristic for silver nanoparticles at 240–450 nm. These strains were selected for further work.

Keywords: microorganisms, urban soils, microbiology, silver nanoparticles

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