



Dynamics of Gram-negative bacteria population density in a soil in the course of the succession initiated by chitin and cellulose

Ivanov Konstantin and Polyanskaya Lubov

Faculty of Soil Science, Lomonosov Moscow State University, Moscow, Russian Federation (ivanov.ke@gmail.com)

The functions of actinomycetes in polymer destruction in soil traditionally considered as the dominant, compare to another groups of bacteria. Gram-positive bacteria also have ecological functions in destruction of soil organic matter. The role of Gram-negative bacteria has been researched in the microbial succession in terms of polymers destruction, which are widely spreads in soils: chitin and cellulose. The method with nalidixic acid as an inhibitor of DNA division of Gram-negative bacteria was modified. By modified method microbial succession of Gram-negative bacteria in the different horizons of a chernozem under aerobic and anaerobic conditions was researched. Chitin and cellulose as the source of nutrients with moistening was used in experiments. The introduction of chitin had no positive effect on the population density of Gram-negative bacteria in a chernozem, but it advanced the date of their appearance in microbial succession: the maximum of Gram-negative bacteria population density was registered on the 3rd– 7th day of the experiment with adding chitin. Compare to the control, which one was without any nutrient adding this dynamics registered much earlier. Consequently, the introduction of chitin as an additional source of nutrition promoted revealing of the Gram-negative bacteria in soil already at the early stages of the succession. In the course of the succession, when the fungal mycelium begins to die off, the actinomycetic mycelium increases in length, i.e. Gram-negative bacteria are replaced at this stage with Gram-positive ones, the leading role among which belongs to actinomycetes. The growth rate of Gram-negative bacteria is higher than that of actinomycetes, so they start chitin utilization at the early stages of the succession, whereas actinomycetes dominate at the late stages. The population density of Gram-negative bacteria was lower under the anaerobic conditions as compared with that in the aerobic ones. The population density of Gram-negative bacteria in the lower layer of the A horizon of the chernozem and in the B horizon was slightly higher only in the case of the chitin introduction. When cellulose was introduced into the soil under aerobic conditions, the population density of Gram-negative bacteria in all the layers of the A horizon of the chernozem was maximal from the 14th to the 22nd day of the experiment. Simultaneously, an increase in the length of the actinomycetal mycelium was observed, as these organisms also perform cellulose hydrolysis in soils. The Gram-negative bacteria began to develop at the stage of the fungal mycelium destruction, which indirectly confirmed the chitinolytic activity of these bacteria.