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Soil microbial communities of postpyrogenic pine forests (case study in Russia)

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Soils, affected by catastrophic wildfires in 2010, were investigated in pine woods of Togljatty city, Samara region with the special reference to soil biological parameters.
The analysis of microbial community of pine wood soils was carried out. It was revealed that wildfires have a negative impact on structure and functional activity of the microbial community postpyrogenic soils. In particular, they influence on values of eukaryotes-prokaryotes ratios, on CO_2 emission intensity and on microorganisms functional state (as it was determined by microbial metabolic quotient) after wildfires. It has been revealed that microbial biomass values and basal respiration rate shows the trend to decrease in case of postfire sites compared with control (in 6.5 and 3.4 times respectively). The microbial biomass and basal respiration values have annual natural variability that testifies to a correlation of this process with soil hydrothermal conditions. However, it was also noted that wildfires don't affect on measured microbiological parameters in layers situated deeper than top 10 cm of soil. An increasing of the values, mentioned above, was observed 2-3 years after wildfires. Zone of microorganisms' activity has been moved to the lowermost soil layers. A disturbance of soil microbial communities' ecophysiological status after the fire is diagnosed by an increase of microbial metabolic quotient value. The metabolic activity of the microbial community decreases in a row: control→crown fire→ground fire. That testifies to certain intensive changes in the microbial community.
High-temperature influence on microbial community has a significant effect on a total amount of bacteria, on a length of actinomycetes' and fungi' mycelium and on a ratio of fungal and bacterial biomass. As a result of wildfires a proportion of the fungi' mycelium (fungi are the main destructors of plant residues) decreases and, finally, it leads to decreasing of soil biological activity.
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