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Diversity of the soil biota in burned areas of southern taiga forests (Tver oblast)

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Abstract

© 2016, Pleiades Publishing, Ltd.Relations between soil biota diversity and its contribution to the performance of some ecosystem functions were assessed based on the results obtained in undisturbed and burned spruce forests near the Central Forest Nature Biosphere Reserve (Tver oblast). In August 2014, in two 4-year-old burned areas, abiotic parameters of the soils, indicators of the state of the microbial communities, the number, taxonomic diversity, and the abundance of the main groups of soil invertebrates (testate amoebae, nematodes, enchytraeids, mites, collembolans, and the mesofauna as a whole) were determined. In the soils of the burned areas, higher CO2, CH4, and N2O emissions were observed. The number of bacterial cells remained similar, and the total length of active mycelium was not significantly different. All this implies a certain intensification of biogenic processes promoting the mobilization of carbon and nitrogen after fire. The number of most of the groups of soil animals was lower (not always significantly) in the burned area than that in the soils of the undisturbed forests. The changes in the taxonomic diversity were specific for each taxon studied. Overall, the diversity of invertebrates was related to the litter thickness. However, the high taxonomic diversity of soil fauna did not always correspond to the active functioning of the ecosystem. Thus, for some taxa, a quite close correlation was found, for instance, between the total number of species (of testate amoebae in particular) and the berry crop, as well as between the soil mesofauna population and the dead wood stock. The total diversity of the investigated taxa included in the detrital trophic web was the most reliable indicator of the carbon stock in the burned areas.

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Keywords

biodiversity, boreal ecosystems, functioning, soil fauna, taiga