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TRANSFORMATION OF FROZEN PEATLANDS SOILS UNDER THE INFLUENCE OF CRYOGENIC PROCESSES

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Soil formation in permafrost conditions takes place under the influence of cryogenic processes, which often determines the morphological and chemical properties of the soil, as well as features of their functioning. The purpose of the real work – to study by laboratory experiment the effect of cryogenic processes such as freeze-thaw and cryoturbation on water extractable organic matter content and microbiological indicators of soils of frozen peatlands.

Objects and methods: The area of the research is located in the North-West Siberia (65 ° 18'.55"N, 72 ° 52'.90"E) in a zone of discontinuous permafrost. Such mire complexes as frozen peatlands are widespread in these locations. The object of our study is peat soil (histoturbels) of frozen peatlands.

The age of investigated peat is 4000 years, the degree of peat decomposition is medium, pH_{H2O} - 4, content of average carbon and nitrogen- 45,0 and 1,7%, respectively, sampling depth is 10-40 cm. In this work the following parameters were studied: basal respiration (BR) of soil and content of microbial biomass carbon (C_{mic}) (Umer, 2011); the content of water extractable organic matter (WEOM) - carbon (WEOC) and nitrogen (WEON) (Brookes, 1985).

During the experiment, samples of soil (field moisture content) were subjected for seven times to 3-day cycles of freeze - thaw at the temperature of -10 and +10 ° C. Before and after each freezing half of the samples were turbated (mixed). The second half of the samples, were not turbated. In the second series of the experiment soil samples were incubated at 4 ° C (with no freeze-thaw), half of which were turbated, and the second part were not turbated.

It was established that BR value under the impact of freeze- thaw and turbation is reduced 1,5 times (from 3,2 to 2,1 mkg CO_2-C $*m^{-2}*h^{-1}$). The carbon content of the microbial biomass (C_{mic}) is reduced almost twice, on the average (500 and 260 mkg $C_{mic}*g^{-1}$, respectively). The response of WEOC and WEON content is less pronounced. As a result of turbations and freeze-thaw these parameters increase, on average (from 600 to 680 mkg * g-1 for WEOC and from 80 to 90 mkg * g-1 for WEON).

Thus, it is shown that freeze - thaw and turbations have significant influence on studied parameters. The carbon content of the microbial biomass (C_{mic}) and basal respiration (BR) are reduced under freezing-thawing and cryoturbation impact. The output of the WEOM from the peat is activated. It was also established that freeze- thaw effect is greater than turbations one and the maximum impact for all studied parameters was found under the combined influence of both processes.