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Microbial communities in paleosoils of archeological monuments of different age as indicators of paleoclimatic dynamics in the steppe of south-east of Russian plain within last 6 kyr

T. Khomutova, T. Demkina, A. Borisov, V. Demkin

Institute of Physicochemical and Biological Problems in Soil Science, Pushchino, Russian Federation (khomutova-t@rambler.ru)

Microbial communities of buried under-kurgan paleosoils may preserve in their properties peculiarities of paleoclimatic conditions of the respective time. We estimated total and active (stimulated by glucose) microbial biomass and trophic structure of microbial communities in A1 horizon of 10 archeological monuments (kurgans) erected in the Eneolith, Bronze, Early Iron epochs and Middle Ages within the chronointerval from 4 mil. BC to 13 c. AD. The monuments were located in different natural regions of the dry-steppe zone of Russia on the territory of Privolzhskaya and Yergeninskaya uplands (Volgogradskaya oblast'). The height of the kurgan embankment varied from 21-28 to 90-102 cm.

Total microbial biomass in buried paleosoils varied from 300 to 4500 μg C/g soil, in control modern soil it was 1.4-8.2 times higher. Total microbial biomass decreased in paleosoils with their age, however not monotonously. In soils buried in 2-3 and 1 cc. AD it was lower than in more ancient ones. Active microbial biomass of paleosoils varied and was generally one order lower than in modern soils. For soils of the Bronze epoch both low (0.4 μg C/g) and high values (10.7 μg C/g) of active microbial biomass were found. The soils of 1 and 13 cc. AD were characterized by high reactivation ability of their microbial communities. The share of active microbial biomass in paleosoils was generally 1-3 orders lower compared to that in modern analogs. However with a tendency of decrease of the share with age of buried paleosoils we found also relatively high estimates for the soils buried in the late Eneolith and in all paleosoils buried in 1 c. AD (1.6-19%). This index in modern soils varied from 9.2 to 24.2%. Microbs well

adapted to scarce nutrition constituted 59-64% in the trophic structure of paleosoils microbial communities, the higher share of those adapted to more rich nutrition was found in the paleosoils dated to 1 c. AD.

The results obtained give evidence that the state of microbial communities in paleosoils of archeological monuments of different age is connected to the dynamics of paleoclimatic conditions, which was essential in the region studied.

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