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The technogenic factor of PAH accumulation in floodplain soils of the Don River Delta

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The Don River Delta is a unique natural structure that performs an important ecological function as a spawning ground for endangered fish species. Shipping is a source of carcinogens of the group of polycyclic aromatic hydrocarbons (PAHs), including benzo(a)pyrene (BaP) - substances of the 1st hazard class. The maximum permissible concentration (MPC) of BaP in the soil is 20 µg / kg. The accumulation of PAHs in the floodplain soils of the delta is especially dangerous since the active washout of pollutants with the soil mass during the flood period (spring) coincides with fish spawning.

The object of the study was saturated alluvial meadow soils. Soil properties vary within the following ranges: pH - 7.3-7.5, organic carbon content - 1.2-2.0%, physical clay - 14.9-19.4%, silt - 4.9-8.9 %. Sampling was carried out to a depth of 0-20 cm. PAHs were extracted from the soil with hexane. Quantitative analysis of PAHs in the extract was carried out using an Agilent 1260 chromatograph. In this work, the content of 16 PAHs included in the list of priority pollutants of the US EPA was determined: naphthalene, anthracene, acenaphthene, acenaphthylene, phenanthrene, fluorene, fluoranthene, pyrene, chrysene, benzo(a)anthracene, BaP, benzo(b)- and benzo(k)fluoranthene, dibenzo(ah)anthracene, benzo(g,h,i)perylene, indeno(1,2,3-cd)pyrene.

This study presents the main patterns of PAHs accumulation in the floodplain soils of the Don River delta used by the shipping channel. The purpose of the study was to establish the influence of the technogenic factor on the accumulation of PAHs in the floodplain soils of the Don River delta. As a result of the study, it was found that, according to the content of PAHs, the soils form the following row: No. 1 - 400 µg / kg> No. 2 - 1729 µg / kg> No. 3 - 9376 µg / kg. A similar series is observed for the amount of BaP in the soil: No. 1 - 22 µg / kg> No. 2 - 201 µg / kg> No. 3 - 2013 µg / kg, which corresponds to an excess of MPC by 1.1, 18 and 100 times.

Thus, the PAHs content in soils increases downstream of the shipping channel. The maximum technogenic load falls on the soil of the monitoring site No. 3, located in the mixing zone of the waters of the Taganrog Bay and the delta of the Don.

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