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Influence of the Military Actions on the Physical and Chemical Characteristics of Soil of the National Reserve “Kreidova Flora”

The object of the research is the department of the Ukrainian Steppe Nature Reserve “Kreidova Flora” as one of the most valuable protected areas of Donbas. "Kreidova Flora" is actually a unique large-sized protected area with cryophilic flora in Ukraine. High content of calcium compounds in the soil is over 3%. It adds this area as the reserve fund. Unfortunately, the reserve has been harmed by military attacks and fortification works. In areas with high density of shelling, soil is mixed with the underlying rock fragments. High content of iron steel and toxic substances have come into soil and atmosphere as a result of detonation.

The aim of the research is to analyze the changes in physical and chemical characteristics of the soil from the area after artillery shelling. For analysis, 6 approximately equal in size craters with the depth of 50 cm and diameter of 25-40 cm have been selected. Two samples have been selected from each of the crater: one directly from the middle of the crater, the second from 25-cm distance from the center. Besides, two samples from the intact areas have been taken as controls.

Physical and chemical soil analysis includes pH index, electrical conductivity, NO_3^- , NH_4^+ , PO_4^{3-} content. The analysis of ICP-MS metal concentration has been also conducted. On average, the soil pH of this area is 7.7-8.0. This index remains unchanged in comparison with the control samples. Electrical conductivity has not changed significantly and ranged from 120 to 250 mS/m. The analysis of content NO_3^- has shown lower concentration in the center of craters than in the samples which have been taken from a 25-cm distance. The analysis of NH_4^+ content has shown lower concentration in samples from the damaged areas than in the control samples. The results of PO_4^{3-} content analysis are very interesting because phosphate behavior is specific in chalk soil and requires further studying. The data obtained from the analysis of micro concentration of metals based on ICP MS indicate the presence of heavy metal contamination of soils and obvious negative influence of military actions on the soil state of the natural reserve.

All the results will be further studied and analyzed for the detailed assessment of physical and chemical properties of soil contamination.

It should be noticed that legal regulation of environmental protection during the military operations on the national level is fragmented. Unfortunately, the Ministry of Defense and other central government departments do not explicitly prescribe implementation environmental monitoring and environmental safety during wartime. The human rights for a safe and healthy environment should never be violated.