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OBSOLETE PESTICIDES DECOMPOSITION IN SOIL USING MAGNETITE NANOPARTICLES

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Soil pollution with different persistent contaminants is a global problem, and the Republic of Moldova is no exception. The application of organochlorine pesticides on the territory of Moldova has been suspended, but several decades of their use in Moldovan agriculture have left hundreds of contaminated places, persistent until now [1]. The elaboration and development of effective technologies for the remediation of soils is an objective necessity. The iron-containing nanoparticles, well-known nanozymes, such as magnetite (Fe_3O_4), that exhibit pronounced redox properties, could be used as a active component of nanobioremediation of polluted soils.

The aim of this study was to evaluate potential of ferrite nanoparticle to remediate the soil, long-term exposed to obsolete pesticides (HCH, DDT and their metabolites). The soil from orchard situated in Călăraș district, Republic of Moldova, was contaminated with obsolete organochlorine pesticides, $\sum$DDTs (dichlorodiphenyltrichloroethane and related compounds) was amounted from 3.0 to 5.0 mg/kg dry soil, $\sum$HCH (isomers of hexachlorocyclohexane) – up to 1.2 mg/kg dry soil. The bioremediation was established *ex situ* and it was designed in oxic and cycled anoxic/oxic conditions. At the set up of the experiment in anoxic conditions the soil was amended with colloidal aqueous solution of Fe_3O_4/PVP nanoparticles. The determination of pesticide residues in soil was confirmed by gas chromatography with mass spectrometry GC/MS multiresidue method. As a result, HCH, represented mostly by persistent beta-HCH isomer, completely disappeared. Concentration of $\sum$DDT decreased by 13 times, mainly due to decomposition of p,p'-DDT. The breakdown of DDT took place both in aerobic and anaerobic pathways, with the formation of DDE and DDD metabolites correspondingly and their further decomposition.

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