Using organic waste to fight soil contamination by heavy metals

14 June 2018

Scientists from Skoltech's Center for Computational and Data-Intensive Science and Engineering (CDISE) in Russia and the Czech University of Life Sciences in Prague have refined the in-situ remediation technology for soils contaminated with heavy metals. The researchers experimentally established the type and concentration of the agent which, when introduced into contaminated soil, significantly immobilizes heavy metals, induces the soil biome to repair itself and creates a healthier environment for the organisms living in the soil. The results of the study were published in the journal *Chemosphere*.

The search for the most effective remediation agents is a hot-button issue throughout the world due to continuous expansion of areas contaminated by heavy metals. Currently, one of the most environmentally safe and affordable remediation technologies is applying natural carbon-containing substances that sorb heavy metals, helping the soil microbial community to recover itself.

The researchers studied three types of inexpensive and widely available substances: biochar (specifically treated coal), humic substance (forming as a result of protein decomposition) and ash. In the course of the experiments spanning a 60-day period, the researchers looked at how different quantities of carbon-containing substances influence the chemical, biological and toxicological characteristics of the soil contaminated by heavy metals. As a result, they selected an agent obtained from vegetable waste and capable of immobilizing heavy metals and improving the overall soil ecosystem.

"In our opinion, humic substances hold the biggest promise, as their high positive effect on the soil is confirmed by the entire range of indicators under study. The research in this direction will be continued," says Skoltech Researcher Maria Pukalchik.

More information: Mariia Pukalchik et al. Biochar, wood ash and humic substances mitigating trace elements stress in contaminated sandy loam soil: Evidence from an integrative approach, *Chemosphere* (2018). DOI: 10.1016/j.chemosphere.2018.03.181

Provided by Skolkovo Institute of Science and Technology