

## CONTAMINATED SOIL REMEDIATION BY SELF-CLEANING PROCESSES ACTIVATION

L. Tatiashvili, I. Mikadze, N. Nonikashvili, T. Uchaneishvili, M. Japaridze

TSU, P. Melikishvili Institute of Physical and Organic Chemistry, 31 A. Politkovskaya Str., Tbilisi, Georgia

[ltatiashvili@gmail.com](mailto:ltatiashvili@gmail.com)

Pollution of various dangerous substances increasingly influences soil fertility and hence the sustainability and productivity of agricultural plants. Increased share of contaminated soils makes it necessary to use more and more environmentally safe chemicals, which provide fast remediation.

In recent years, humic compounds are used for soil remediation and reinstatement. Interest in them has grown since it was revealed that the humic compounds are capable of binding heavy metals' (zinc, lead, arsenic, chromium, nickel, etc.) radionuclides and toxic forms. Formatted compounds and complexes stay stable and remain sustainable for more than 100 years towards chemical and microbiological impact. Another effective solutions are humic compounds to organic ecotoxicants. As a result of their exposure to petroleum hydrocarbons and oil, contamination of the substrate decreases 6 times in 1,5-2 months, while the content of pesticides in soil and chlorobiphenyls - nearly 100 times in 50-60 days [1].

While treating the contaminated soil with humic compounds, the ion-exchange, adsorption and coagulation processes are going at the same time, which provide effective soil readjustment (detoxification). Layers are formed, in which a variety of toxicants and humic compounds produce (in pH wide range), practically non-migratory, stable and steady compounds - hardly accessible for microorganisms [2].

The research aims to develop a method of ecosystem restoration for polluted soil fertility saving methods.

Multicomponent pollution cleanup requires natural ecological systems self-activation process, when all three soil biological agents (bacteria, fungi, plants root system) are supplied with food substrates with easily digestible form. We will use local coal and peat oxidized forms, enriched with micro-elements. Disintegrative compounds usually degrade easily and quickly, but high-molecular part requires more time.

Accelerated phytoremediation process is necessary because of the long period of degradation. In this case we will provide high silicon containing natural concentrates that accelerate the growth of the plant's root system, resistance to stress, improve mechanical strength. In addition, adding natural boron minerals will also reduce the number of toxins [3].

It is possible to increase efficiency in humic compounds with active silicon. High silicon-containing supplements can be produced using natural diatomaceous earth in Akhaltsikhe. Changing silicon containing mineral (diatom) to liquid silicon dioxide decreases acids content in humic compounds. This compounds could be used together as an innovative research project.

### References:

- [1] Ma JF, Yamaji N. Trends Plant Sci. 11(8) (2006). 392-397.
- [2] Belanger RR, Benhamou N, Menzies JG. Phytopathology (2003). 402-412
- [3] Wang L, Nie Q, Li M, Zhang F, Zhuang J, Yang W, et al. Applied Physics Letters (2005). 194-198.