

Effect of Mineral-Organic Mixtures on Ecotoxicity in Contaminated Soil

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Abstract

The application of mineral-organic mixtures, which contain mineral fertilisers, zeolites, leonardite or lignite, may lead to major changes in chemical properties of soil as well as in the structural and functional diversity of microbial populations. On the other hand the decomposition of this materials in soil may directly result in the appearance of various amounts of intermediate decomposition products in the environment. For this reason, the assessment of soil quality on the basis of the reactions of living organisms (bioindicators) can provide a lot of valuable information about the potential environmental risk associated with the application of this type of material. Therefore, the research was to evaluate the influence of the addition of mineral-organic mixtures with the addition of zeolite composites (NaX-Vermiculite and NaX-Carbon) and organic additives (lignite or leonardite) on ecotoxicity in loamy sand soil contaminated with cadmium, lead and zinc. To ascertain the toxicity, three different bioassays were used: the liquid phase test with luminescent bacteria (*Vibrio fischeri*; Microtox), the solid phase test with crustacean (*Heterocypris incongruens*, OSTRACODTOXKIT F test; MicroBioTests) bioassays and *Phytotoxkit* test, using *Sinapis alba* [1]. No correlation between the applied dose of organic materials and inhibition of *Vibrio fischeri* luminescence was observed. The factor with a stronger impact on the activity of *V. fischeri* was the kind of mineral-organic mixtures. The use of the OSTRACODTOXKIT F test (MicroBioTests) showed that the addition of mineral-organic mixtures not reduced the soil toxicity to *Heterocypris incongruens* compared with the control soil. In the Ostracodtoxkit F test, 100% *H. incongruens* mortality was found. Luminescence inhibition of *V. fischeri* was between 69 and 79%.

References

- [1] Persoone G., Marsalek B., Blinova I., Törökne A., Zarina D., Manusadzianas L., Nałecz-Jawecki G., Tofan L., Stepanova N., Tothova L., Kolar B. 2003. A practical and user-friendly toxicity classification system with microbiotests for natural waters and wastewaters. *Environ. Toxicol.* 18(6), 395-402.

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