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Consequences of Some Remediative Techniques Used in Sewaged Soil Bioremediation on Indigenous Microbial Activity

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Abstract : Remediation of cultivated sewage soils in Egypt become an important aspect in last decade for having healthy crops and saving the human health. In this respect, a greenhouse experiment was conducted where contaminated sewage soil was treated with modified forms of 2% bentonite (T1), 2% kaolinite (T2), 1% bentonite+1% kaolinite (T3), 2% probentonite (T4), 2% prokaolinite (T5), 1% bentonite + 0.5% kaolinite + 0.5% rock phosphate (RP) (T6), 2% iron oxide (T7) and 1% iron oxide + 1% RP (T8). These materials were applied as remediative materials. Untreated soil was also used as a control. All soil samples were incubated for 2 months at 25°C at field capacity throughout the whole experiment. Carbon dioxide (CO2) efflux from both treated and untreated soils as a biomass indicator was measured through the incubation time and kinetic parameters of the best fitted models used to describe the phenomena were taken to evaluate the succession of sewaged soils remediation. The obtained results indicated that according to the kinetic parameters of used models, CO2 effluxes from remediated soils was significantly decreased compared to control treatment with variation in rate values according to type of remediation material applied. In addition, analyzed microbial biomass parameter showed that Ni and Zn were the most potential toxic elements (PTEs) that influenced the decreasing order of microbial activity in untreated soil. Meanwhile, Ni was the only influenced pollutant in treated soils. Although all applied materials significantly decreased the hazards of PTEs in treated soil, modified bentonite was the best treatment compared to other used materials. This work discussed different mechanisms taking place between applied materials and PTEs founded in the studied sewage soil.

Keywords : remediation, potential toxic elements, soil biomass, sewage
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