

Agronomical and environmental soil quality under sewage sludge amendment and treated wastewater irrigation

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Abstract.

This study was carried out to evaluate the agronomic proprieties and the heavy metals contamination of soils from Boumerdes. Agronomical parameters, concentration and metals speciation were determined by soils, urban treated wastewater (TWW) and sewage sludge (SS).

The TWW and SS collected was rich in organic matter, N, P and K. Thus, this result is one positive outcome for their applications on soil. We found that the agronomic quality of the treated soils has not decreased. Both SS amendment and TWW irrigation brought high amounts of nutrients, nutrients availability, and soil organic matter. The pH increase does not seem to be a problem for the crops growth.

Exposure to heavy metals may cause adverse effects to human health and the environment. Sequential extraction was used to evaluate the concentration and bioavailability of Cd, Cu, Ni, and Zn from three agricultural soils. Only Cu (151 mg.kg^{-1}) concentration in wastewater-irrigated soil exceeded the permissible limits defined by Algerian norm (NA-17671). Under TWW irrigation the Copper amount increased significantly, but the bioavailability remind equivalent to others soils often under 41% of the total concentration. However, the SS application lied from the soil most quantity of Cu (71 mg.kg^{-1}) and Zn (95 mg.kg^{-1}), with accumulation rate between 1,7 and 3,2 the concentration of referential soil. Amount of Cd in the soils was less than $0,3 \text{ mg.kg}^{-1}$.

This investigation concluded that TWW and SS improved agronomical potentiality of soils. However, continued application may lead to accumulation of metallic element and constitute a potential environmental hazard.

Keywords: sewage sludge, treated wastewater, nutrients, heavy metals, soil quality