



The effect of sludge from the wastewater treatment plant of TIARET (ALGERIA) on the growth of turnip "Brassica rapa"; Morphological responses and potential efficacy of phytoremediation

Leila Soudani¹, Benchohra Maamar¹, Meriem Chafaa¹, Belgacem Nouar², and Oliver Wiche³

¹Ibn khaldoun university TIARET, Tiaret, Algeria (soudani_leila@outlook.fr) (benchohra_19@hotmail.fr) (chafaa.meriem@yahoo.fr)

²Abu Bakr Belkaid University, Tlemcen, Algeria (nouar.belkacem@hotmail.fr)

³Bergakademie Freiberg, Freiberg, Germany (oliver.wiche@ioez.tu-freiberg.de)

Wastewater treatment always produces a large amount of sludge. The different uses of sludge disposal have negative consequences for the environment. Agricultural use may appear in some situations as an alternative to current solutions, both to optimize the degradation and recycling of organic and mineral elements. During this work, on the one hand, we investigated the effect of sludge on the growth of turnip (*Brassica rapa*), a plant that tolerates metallic trace elements, especially lead (Liu et al., 2000) and which is considered a model plant in eco-toxicology (Sun et al., 2010), and on the other hand to determine if it has the potential to be included in phytoremediation systems.

The seeds were put in different substrates that contained three sludge doses: 20%, 40% and 60%, mixed with agricultural soil which contained high levels of metallic trace elements exceeding the standard eligible concentration by AFNOR. compared to the soil, concentrations of potential toxic trace elements in sludge were lower than in soil. Morphological measurements were carried out during two months of planting, showing the positive effect of the sludge on the growth of the plant. The recorded biometric values (height, number of leaves, weight, rotation and height of the bulb) for all doses, far exceed those of control plants (100% soil), with high values recorded in the mixture of soil with 60% sludge.

The concentration of metallic trace elements in the different substrates and also in the leaves and the turnip bulb after two months of planting shows that the plant accumulates and tolerates high concentrations of elements and can therefore be used as a phytoremediator for polluted soils. The highest levels of metal accumulation were observed on the substrate in the soil mixture with 60% sludge.