University of Zabol
Graduate School
Faculty of Water and Soil
Department of Soil Science

Thesis Submitted in Partial Fulfillment of the Requirement for the degree of Master of Science (M. Sc) in Soil Science

The Effect of Biochar on Uptake of Lead and Cadmium from Paper Factories Sewage sludge by Sunflower (*Heliantus annus*)

Supervisor:
Dr. A. Gholamalizade Ahangar

Advisor:
Z. Mokhtari
M. Ghorbani

By:
A. Hejazizadeh

Jan 2015

Abstract

Application of sewage sludge in agricultural lands is a suitable selection for solving management problems of sewage sludge, besides its economic benefits. Of the main limiting factors to use sewage sludge is its high content of heavy metals such as lead and cadmium. The aim of this study was to investigate the influence of Biochar on lead and cadmium uptake by Sunflower (*Heliantus annus*) from Paper Factories sewage sludge. *Biochar* produced from thermal decomposition of biomass under the pyrolysis process and its surface includes many organic functional groups at which potential causes the complexes with metal ions increase. For this purpose, a factorial greenhouse experiment as a complete randomized design with Three replications was conducted. Different levels of sewage sludge with 0, 15, 20 and 25 (g/kg) and Biochar with 0, 5, 10 and 15% (g/kg) and an un-amended control pot were used in order to examine the sewage sludge influence. The results from findings showed that main treatment (biochar) did not have any significant effect on the plant height, dry weight of roots and shoots of plants, but the results of interaction of sewage sludge and biochar showed that in all sewage sludge levels in soil with increasing levels of biochar was observed an increasing trend in the above parameters, which was significant increase in some sewage sludge levels and did not have significant effect on the some other. But in general the greatest extent of these parameters was observed at 15 g per Kg biochar and the least extent was observed at zero level of biochar. In addition, increasing sewage sludge uptake and application of biochar caused decreasing lead and cadmium uptake through root and shoots of plants. The highest extent of decrease was observed at 15 g per Kg of biochar and the least degree was observed at zero level. The results from findings showed that biochar can lead to lead and cadmium uptake from soil where it can be used in order to reduction the heavy pollutants from contaminated soil.

Key Word: Lead, Cadmium, Paper Factories Sewage sludge, Biochar, Sunflower