

Particle size and rate of biochar affected the phytoavailability of Cd and Pb by mustard plants grown in contaminated soils

ABSTRACT

Various amendments are used to reduce the phytoavailability of heavy metals in contaminated soils, but recently the use of biochar is receiving serious attention. In this study, two particle sizes of an oil palm empty fruit bunch biochar (EFBB); $<50\ \mu\text{m}$ (F-EFBB) and $>2\ \text{mm}$ (C-EFBB) were applied at either 0, 0.5, or 1% (w/w) to soils contaminated with either Cd or Pb and the phytoavailability of these metals by mustard plants grown on the soils was evaluated. Results revealed that the application of EFBB at 1% significantly increased plant growth parameters as compared with the control in Cd-soil. However, there was no significant effect of EFBB application rate on plant growth parameters in Pb-soil. There was a significant difference in the concentrations of Cd and Pb in the plant root and shoot between soils receiving different particle sizes of EFBB. The treatment of 1% F-EFBB gave the lowest concentration of the Cd concentration in the shoot ($115.200\ \text{mgkg}^{-1}$) and Pb concentration in the root and shoot (4196.000 and $78.467\ \text{mgkg}^{-1}$, respectively) as compared with the other treatments. Therefore, F-EFBB application at high rates can be recommended for reducing the phytoavailability of Cd and Pb in contaminated soils.

Keyword: Biochar particle size; Contaminated soil; Heavy metals; Mustard plant; Phytoavailability