Soil enzymatic activities and microbial community structure with deferent application rates of Cd and Pb

Khan S, Cao Q, Hesham A, Xia Y, He J.

Abstract:

Abstract This study focused on the changes of soil microbial diversity and potential inhibitory effects of heavy metals on soil enzymatic activities at different application rates of Cd and/or Pb. The soil used for experiments was collected from Beijing and classified as endoaquepts. Pots containing 500 g of the soil with different Cd and/or Pb application rates were incubated for a period of 0, 2, 9, 12 weeks in a glasshouse and the soil samples were analyzed for individual enzymes, including catalase, alkaline phosphatase and dehydrogenase, and the changes of microbial community structure. Results showed that heavy metals slightly inhibited the enzymatic activities in all the samples spiked with heavy metals. The extent of inhibition increased significantly with increasing level of heavy metals, and varied with the incubation periods. The soil bacterial community structure, as determined by polymerase chain reaction-denaturing gradient gel electrophoresis techniques, was different in the contaminated samples as compared to the control. The highest community change was observed in the samples amended with high level of Cd. Positive correlations were observed among the three enzymatic activities, but negative correlations were found between the amounts of the heavy metals and the enzymatic activities.

Keywords:

soil contamination; heavy metals; application rate; enzymatic activity; microbial community

Published In:

Journal of Environmental Sciences, Volume 19, Issue 7, Pages 834-840