

Investigation of lead desorption from Pomelo peel amended in the soil after water treatment

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Pomelo peels have been reported as an efficient biosorbent for lead removal from wastewater treatment process. The efficiency of lead adsorption was 8.80 ± 0.27 mgPb/g biomass (approximately 94.7% removal from 100 ppm Pb(NO₃)₂ solution). Eventually, the adsorbed lead on the biomass surface could potentially desorb and contaminate the soil-water system during the land disposal. This current work aimed to examine the amounts of lead desorption from the biosorbent waste in amended soil sample up to three months (10% w/w). The desorption experiments were performed under two widely used techniques; single extraction and column leaching study. The lead desorption was evaluated using two common eluents, which were 0.01 M Ca(NO₃)₂ and 0.04 M EDTA solutions. The neutral salt reagent such as Ca(NO₃)₂ can be used for lead extracted from exchangeable soil phase. On the other hand, a stronger EDTA chelating extractant was overly affected lead in soil carbonate and soil oxides phases. Under the single extraction system, the results have shown that the highest amounts of lead desorption were observed at 8.71 ± 0.10 mgPb/kg amended soil obtained from Ca(NO₃)₂ (1 month) and 858 ± 52.33 mgPb/kg obtained from EDTA (3 months) (0.52% and 65.0% desorption; n = 3), respectively. For the column leaching study, the amounts of lead desorption were reported at 75.53 ± 8.77 mgPb/kg obtained from Ca(NO₃)₂ (1 month) and 683.53 ± 19.59 mgPb/kg obtained from EDTA (3 months); (4.89% and 44.61% desorption; n = 3), respectively. It can be noticed that the desorbed lead could be occasionally fixed by soil carbonate phase when the amended time increased as found in Ca(NO₃)₂ extraction at 1 month. It can be noticed that the adsorbed lead could potentially become harmful on land disposal. Moreover, these results also indicated that column leaching experiments were practically effective and realistic for monitoring lead contamination to soil system.