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The effects of substrate type, HRT and reed on the lead removal in horizontal subsurface-flow constructed wetland

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ABSTRACT

In this research, between June 2013 and October 2013, the effects of three substrate types, hydraulic retention time (HRT), and Phragmites (common reed) on the removal of lead in horizontal subsurface-flow constructed wetlands (CWs) were investigated in the Islamic Republic of Iran. The results showed that the more HRT increased, the more removal efficiency (RE) increased, so that there was a significant difference between RE in sand substrate and retention times of 1, 3, and 5 d ($p < 0.05$), while no significant difference was observed between 5 and 10 d retention time at 5% level. Moreover, there was a significant difference between retention times of 1 and 3 d in two fine- and medium-gravel substrates ($p < 0.05$), but no significant difference was observed between retention times of 3, 5, and 10 d at 5% level. Therefore, the best HRT for sand, gravel, and medium-gravel substrate was recommended 5, 3, and 3 d, respectively, with the maximum efficiency of 88.51, 81.53, and 80.35%. The analysis results of substrate type also showed that sand substrate had higher efficiency than the other two substrates. Moreover, the results indicated the root of reed is highly capable of assimilating and accumulating influent lead and plays an important role on the lead removal in horizontal subsurface-flow CW.

Keywords: Synthetic wastewaters; Horizontal subsurface-flow constructed wetland; Lead removal efficiency; Substrate type

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