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Mobility of As, Cr and Cu in a contaminated grassland soil in response to diverse organic amendments; a sequential column leaching experiment

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Abstract

In this study, sequential column leaching coupled with batch sequential extraction assays were used to assess the fate of arsenic, chromium and copper in a wood ash contaminated alkaline grassland soil amended with biochar and its non-pyrolysed origin source material. Application of both amendments resulted in a general reduction of copper and arsenic mobility. Chromium, confirmed to be highly mobile under the high pH conditions of the experimental soil, was also stabilised with both amendments, though its mobility was more significantly reduced in soils amended with the source material. This was attributable in part to lower pH in the source material amended soils when compared to the biochar amended soils which facilitated the reduction of the more mobile chromium (VI) to less mobile chromium (III), as confirmed by ion exchange chromium speciation. In this study, the use of biochar vs source material was beneficial only for select metals, thus highlighting the importance of considering the specific physico-chemical conditions and metal(loid) properties in contaminated soils during the evaluation of remediation strategies.

Keywords *arsenic, chromium, copper, biochar, leaching, ash, speciation, CCA*

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