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Extended Abstract

Mining activities are one of the main sources of environmental contamination through metal(loid)s released due to soil erosion. High concentrations of metal(loid)s in soils and consequently into groundwater could have negative effects on terrestrial ecosystems and could pose potential health risks. Consequently depollution techniques such as physical or chemical methods have been developed to reduce the impact of such pollutions. However these techniques are expensive and disturb the normal biological soil activities. Phytoremediation techniques, which use specific plants and the associated microorganisms to control soil metal(loid)s availability *in situ*, are low cost alternative technologies. However few physicochemical characteristics of tailings such as low pH, and metal(loid)s toxicity could limit this strategy. Moreover, polluted soils are often agronomically poor, that is why often amendments either organic or inorganic must be applied to allow the establishment of vegetation. Among the amendments used, biochar has attracted attention in recent years because of its beneficial effects on soil fertility but also as a metal(loid)s sorbent.

In particular cases, biochar application to contaminated soils does not contribute effectively by itself to the growth of plants and sometimes the soil must be supplemented by other amendments such as compost. Therefore, the combination of amendments seems a better option for improving the agronomic capacity of a technosol while maintaining the biochar capacity to immobilize the metal(loid)s pollutants.

The objectives of our study were to evaluate, in pots, the capacity of dwarf bean as a plant indicator to germinate and grown on a mining technosol (Pontgibaud, France; mainly contaminated by Pb and As) amended by biochar +/- compost; and to characterize soil phytotoxicity.

When biochar was added to the technosol, soil pore water (SPW) pH and electrical conductivity increased significantly whereas lead SPW concentration decreased almost by 90%. In the opposite, SPW arsenic concentration increased after biochar addition but remains lower when compared to the biochar + compost amendments. The aerial dwarf bean dry biomass was ameliorated on technosol amended by biochar or by the biochar + compost association compared to the non-amended technosol. For all conditions, root biomasses were also ameliorated with amended technosol. In the aerial organs, arsenic and lead concentrations were less important or equal to the concentrations measured when dwarf bean were grown on non-amended technosol. For the two amended conditions, arsenic concentrations in roots were equal or significantly lower compared to non-amended technosol.

In conclusion, biochar and compost addition to the Pb and As contaminated soil allows the dwarf bean growth. Such amendments reduced the technosol phytotoxicity by decreasing Pb disponibility in SPW. However biochar addition allow arsenic remobilization. As alternatives, other amendments such as iron are under investigation in addition to biochar to decrease As SPW disponibility.