

Using plant species for phytoremediation of highly weathered soils contaminated with zinc and copper with application of sewage sludge

ABSTRACT

The ability of woody plant species to remediate heavy metals contaminated soils was investigated with the addition of sewage sludge. *Jatropha curcas*, *Hibiscus cannabinus*, *Acacia mangium*, and *Syzygium cumini* growth was monitored on an Oxisol- and an Ultisol-treated soil with sewage sludge at a level of 0% w/w, 5% w/w, or 10% w/w. The sewage sludge was found to enhance soil fertility, as shown by an increase in soil pH, cation exchange capacity, exchangeable bases (potassium, calcium, and magnesium), available phosphorous, total carbon, and total nitrogen. However, zinc and copper accumulated in soils at toxic levels; thus, they had to be removed before being used for crop production. The concentration of the two heavy metals in *Jatropha curcas* and *Hibiscus cannabinus* at harvest were higher than those of *Acacia mangium* and *Syzygium cumini*. The high uptake of zinc and copper by the first two plant species was the result of their high translocation factor, although the bio-concentration factor was low. Thus, *Jatropha curcas* and *Hibiscus cannabinus* were considered tolerant to zinc and copper toxicity and able to remove the metals efficiently from the contaminated soils.

Keyword: Phytoremediation; Heavy metal; Oxisol; Ultisol; Translocation factor; Bio-concentration factor