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Remediation of tropical urban soils under metallic pollution using local plants species in Yaoundé, Sub-Saharan Africa

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Urban pollution affects urban soils and this remains a major preoccupation. In Cameroon especially, this has been proven as the urban population keep mounting pressure on urban agriculture with multiple effects ranging from surface and groundwater pollution to effects on human health. Studies regarding suitable crops and metals species have not been given due consideration in Cameroon as far as soil pollution and remediation is concerned. The present study has as main aim to evaluate the efficiency of some local crops to take up toxic and non-toxic elements with focus on nickel and other economic valuable elements like germanium and REE. For this purpose, a 30 meter square greenhouse was constructed. In this structure, four replicates each, of Zea mays (*Poacaea*), Glycine max (*Fabaceae*), Arachis hypogea (*Fabaceae*) and Panicum maximum (*Poacaea*) were randomly cultivated on ferrasols collected from the Ntem watershed in Yaoundé, Centre Region. Two kilogram and 6 Kg of these soils were measured into 2L and 6L experimental pots subjected to three different treatments ($NiSO4.6H_2O$, $La(NO_3)3.6H_2O$, GeO_2) plus control for mono and mixed cultures respectively. Mixed cultures referred to a combination of one leguminous species (G. *max* or A. *hypogea*) as focus plant with the two grass species as target plants in one pot. A total of 21 pots (6 = mixed cultures, 15 = mono culture) each were treated with 0.004M nickel, 0.00031M lanthanum and 0.00014M germanium prior to transplanting and 21 pots were used as controls (non-artificially contaminated soil). This experiment is on-going at the Ebolowa campus (South Region) of the Faculty of Agronomy and Agricultural Sciences of the University of Dschang, Cameroon. The roots and shoots will be harvested and analysed, including rhizosphere and non rhizosphere soil, separately following the protocol for microwave-acid-assisted digestion preceding ICPMS determination at the Biology/Ecology laboratory of TU Bergakademie Freiberg, Germany

The preliminary results of this greenhouse experiment clearly show a remarkable negative effect of Ni on all the crops with a reduced biomass production. There is an interesting aggregation of nickel salt particles surrounding the withering stems of Z. mays. On the other hand, crops cultivated on La and Ge contaminated soils do not show any phenotypic differences with those on control.

The expectation from this study is to be able to distinguish the local species capable of high biomass production and high elemental accumulation. It is expected that phytoexctraction efficiency of the grass species should be high under the mixed cultures than under mono cultures due to enhancing effects of rhizosphere exudates from legumes on availability of target elements in the soil. The outcome of this finding can be implemented in real systems as those species that are found to accumulate more in their above ground tissues can subsequently be used for energy production, phytoremediation and phytomining.

Keywords:
Phytoexctraction; Zea mays; Glycine max; Arachis hypogea; Panicum maximum; Urban soils