

Soil Characterization and Identification of Native Hyper-Accumulating Plant Species for Phytoremediation¹

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Abstract: Though mining (both legal and illegal) is common in most African countries, reclamation efforts remain limited. Previous studies within the contaminated gold mine sites in the southwest region of Nigeria showed its elevated heavy metal content, negative impacts on the floristic association, and identification of phytoremediation as the preferable remediation technique. For implementation purposes, the aim of study is to characterize the soil properties and identify native hyper-accumulating plants with high level of tolerance growing on three considered sites, an abandoned mining site (Site 1), an active mining site (Site 2), and an undisturbed vegetation site (Control site). Based on recommendations from previous studies, the accumulation and enrichment potential of Pb, Cd, Fe, and Cu in *Crinum jagus*, *Acanthus montanus*, *Musa sapientum*, *Theobroma cacao*, *Chromolaena odorata*, *Melochia corchorifolia*, *Melanthera scandens*, *Palisota ambigua*, and *Pteris togoensis* were determined. Soil and plant samples (leaves, stem, and roots) were analyzed for total heavy metal concentrations using AAS. Influencing soil properties; pH, Electrical Conductivity, textural class, percentage Total Nitrogen, Organic Carbon, and Organic Matter were analyzed at two soil sampling depth (0-20 and 20-40 cm). ERT using ABEM Terrameter at an electrode spacing of 1 m was done to characterize the soil subsurface structure and its heterogeneity nature. All the studied plants show high accumulation potential of Pb with extraordinarily high Fe contents. All the studied species except *Musa sapientum* and *Theobroma cacao*, (which are the commonly grown crops), show high accumulating potential for all the metals, however, the hyper-accumulating efficiency of *Crinum jagus* was the most significant among all the species. On all the sites, pH, OM, OC, and total metal content decreases with soil depth. High heterogeneity was noticed in the subsurface (lower than 1 m) on both site 1 and 2, however, site 2 was more evident, and it shows presence of foreign material. Since *Musa sapientum*, and *Theobroma cacao* (the commonly grown plants) are both deep root crops, use of deep root species (tress) in combination with identified hyper-accumulating plant species is recommended.³

Additional Key Words: Electrical Resistivity Tomography (ERT), tropical countries, *Crinum jagus*, Bioconcentration Factor (BCF), Translocation Factor (TF), Enrichment Factor (EF).

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3. Work reported here was conducted near 7°31'30"N, 4°39'03"E.