

## Efficiency of Natural Geo-Sorbents in Remediating Lead (Pb)

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### Abstract

Forest dieback in Horton Plains, Sri Lanka, has become a disastrous environmental problem in the country. More than a natural forest, Horton Plains may also be the most important water catchment and a biodiversity hotspot. Although there are dozens of factors identified as reasons for the forest dieback in Horton Plains, soil pollution by Pb has been identified as one of the key factors behind the problem. This study focused on finding a cost-effective solution to remediate the contaminated soils in Horton Plains. The efficacy of three (3) geo-sorbents made from plant materials were used to assess their capacity for the immobilization of soil Pb. Soil samples collected from the worst affected area with 100% forest dieback, Thotupolakanda in Horton Plains were used for the laboratory experiment. Three types of biochar materials which have been tested negative for Pb, (a) Rubber Nut Shell (RNB) (b) Rice Husk (RHB) (c) Naturally developed Biochar (HPB) in Horton Plains, were used to study their immobilization capacity in relation to the Pb in contaminated soils. Soil samples were spiked with 500ppm standard Pb at a rate of 10 mL per sample and treated with biochar at a rate of 5% in each sample. The soil samples were then left for incubation at room temperature for 14 weeks. The efficiency of biochar in immobilizing soil Pb was assessed by using Pb-spiked soil samples. Soil pH was 5.4 and the cation exchange capacity (CEC) was 210 cmolc/Kg soil. Soil organic matter (SOM) content was high (13.4%). It was evident that the Pb immobilization capacity of RHB is the highest – followed by RNB ( $P < 0.0001$ ). HPB was proven to be ineffective in immobilizing soil Pb. Thus, RHB appears to be a cost-effective sorbent to remediate Pb contaminated soils in Horton Plains. Starting from the worst affected, soils in all the dieback affected areas in Horton Plains should be treated by RHB at a rate of 5% in the top soil.

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