

Remediation of Cadmium (Cd) Contaminated Montane Forest Soils (Horton Plains): Will Rubber (*Hevea brasiliensis*) Nut Shell and Rice Husk Bio Char be Effective Remediating Agents?

J.S.R.De Silva^a, P.I.Yapa^a, R.Bandara^b and A.A.Seneviratne^c

^a Department of Export Agriculture, Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka

^b Faculty of Geomatics, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka

^c Faculty of Applied Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya, Sri Lanka
rasanjaliyamuni7@gmail.com

Horton Plains, one of the two montane forests in Sri Lanka and habitat to many endemic species of plants and animals, has been severely affected by forest dieback. Past research has identified a direct link between soil pollution with Cadmium (Cd) (through atmospheric pollution) and the phenomenon of forest dieback. As a consequence, forest dieback is increasing proportionately to the soil pollution. As such, it is imperative to protect Horton Plains and this study focuses on identifying a cost-effective remediation technique to neutralize soil Cd thereby reducing forest dieback. This experiment was conducted for a period of three months. Soil samples were collected from Horton Plains, mainly Thotupolakanda site which showed more than 90% severity of forest die back. The tree soil amendments used in this research were bio char prepared using (i) rubber nut shells, (ii) rice husks and (iii) bio char occurring naturally in Horton Plains. Along with the control treatment (only soil), this experiment consisted of four treatments of 5 replicates. Treatments were added to the soil samples, available Cd was extracted using standard methods in literature and the Cd concentrations were analysed using the Atomic Absorption Spectrophotometer (AAS). Horton Plains forest soil used for the study showed a pH of 5.4 and a Cation Exchange Capacity (CEC) of 210 c moles kg⁻¹. The soil was highly rich with organic matter and the soil organic matter (SOM) content had reached 13.4%. Immobilization of Cd added to the soil was observed and it was significant ($p < 0.03$). However, the control treatment (only soil) has also shown its ability to immobilize soil Cd. Thus, it appears that the presence of extraordinary level of SOM and active natural sorbents in SOM such as humic acid and fulvic acid have masked the effect of all the biochar treatments. The amount of Cd used for spiking the soil was 0.1 µg and the minute quantity might have been immobilized by the SOM. However the study proved the possibility of neutralizing Cd toxicity in the soil by using natural sorbents and other treatments did not show that much of Cd neutralizing.

Keywords: Biochar, Cadmium, forest dieback, Horton Plains, soil remediation