Investigating the use of Water Hyacinth and Rice Hull Biochars to improve the growth of *Vigna unguiculata* in Cadmium Contaminated Soils

***Ronilcia Williams¹, Abdullah Ansari² and Courtney Bullen³**

¹Department of Environmental Studies. Faculty of Earth and Environmental Sciences. University of Guyana – Turkeyen Campus. Greater Georgetown, Guyana. [*roniwilliams897@gmail.com](mailto:roniwilliams897@gmail.com).

²Department of Biology. Faculty of Natural Sciences. University of Guyana – Turkeyen Campus. Greater Georgetown, Guyana.

³Department of Agriculture. Faculty of Agriculture and Forestry. University of Guyana – Turkeyen Campus. Greater Georgetown, Guyana.

DOI: 10.52377/QYXG2440

The increase of fossil fuel combustion; application of chemical fertilisers; and advances in metallurgical techniques have prompted the need for sustainable alternatives that remedy heavy metal contamination of soil. Studies show that bio char is an efficient and cost effective material derived from organic biomass; it has the ability to adsorb and remediate heavy metal polluted soils. This study sought to highlight the use of water hyacinth and rice hull derived bio char as a means of improving the growth of *Vigna unguiculata* grown in cadmium polluted soil. These two forms of feedstock were harvested and subjected to slow pyrolysis using a two-drum kiln. The charred materials were then applied to cadmium polluted soil at two application rates (20 t/ha and 10 t/ha). Cadmium soil contamination was simulated by introducing 0.7 mg/kg of CdCl₂ into the soil. The vegetative growth parameters for six treatments were measured and recorded for ten weeks; thereafter, soil was collected and prepared for analysis. The pH metre and Atomic Absorption Spectroscopy were used to determine soil pH and cadmium concentration per treatment, and were analysed using ANOVA and pair-wise comparisons. The findings revealed that: cadmium toxicity had a significant effect on the vegetative growth parameters of *Vigna unguiculata*; rice hulls bio char applied at 20 t/ha was most effective in improving growth in cadmium polluted soil; and water hyacinth and rice hulls bio char were proven to adequately reduce and remove cadmium toxicity.

Keywords: Bio char; cadmium; remediate.