

# Environmentally Sustainable Management of Water Hyacinth (*Eichhornia crassipes*) in Guyana

\*Jonelle Cornette<sup>1</sup>, Clairmont Clementson<sup>2</sup> and David Fredericks<sup>2</sup>

<sup>1</sup>Department of Environmental Studies. Faculty of Earth and Environmental Sciences. University of Guyana – Turkeyen Campus. Greater Georgetown, Guyana. \*[cornette\\_jonelle@yahoo.co.uk](mailto:cornette_jonelle@yahoo.co.uk).

<sup>2</sup>National Agricultural Research and Extension Institute. Mon Repos, East Coast Demerara, Guyana.

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The increase of greenhouse gases and chemical fertiliser use due to increasing energy needs have contributed to climate change concerns. This has prompted the need for alternative, environmentally friendly, and renewable sources of energy. The water hyacinth (*Eichhornia crassipes*) presents a challenge to drainage system management as it is a rapidly growing water weed, and to public health as it provides a breeding area for mosquitoes. Integrated control of water hyacinth can ensure economic and environmental benefits while managing the weed population. This research seeks to highlight an opportunity to derive economic and environmental benefits from water hyacinth, thereby mitigating against its associated environmental issues. This study characterised biochar produced from water hyacinth at three pyrolysis temperatures, then examined its suitability as a soil amendment and its energy and carbon capture potential. Increasing the pyrolysis temperature transformed the biomass matrices into a lighter and porous structure, causing a decrease in density. There was an increase in ash and fixed carbon content, and volatile matter decreased as pyrolysis temperature increased. This indicated that higher concentrations of organic matter from water hyacinth are available for carbon sequestration at higher pyrolytic temperatures. Further, based on the presence of micro-nutrients and high pH, the biochar produced from the samples were suitable as a liming agent and as a soil amendment for vegetables, legumes, and grains, in both open-field and shaded conditions. The water hyacinth biochar is recommended as a fertilisation and soil improvement additive to aid Guyana's agricultural expansion into the Hilly Sand and Clay Region.

**Keywords:** Water hyacinth; biochar; soil amendment; carbon sequestration