



A soil's Water Retention Capacity (WRC) is a potential indicator of soil quality and productivity. Mined-spoils in Guyana are generally sandy soils with low organic matter; reducing the soil's WRC and the ability to retain nutrients in the soil profile.

One way to improve soil's WRC is to gradually incorporate organic amendments that contain a high percentage of organic matter such as biochar/charcoal into the soil. A greater quantity of water remaining in the soil implies reduced hydric stress of plants and potentially improvement in crop yield.



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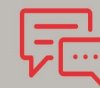
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## NATIONAL AGRICULTURAL RESEARCH AND EXTENSION INSTITUTE

## THE USE OF CHARCOAL AND BIOCHAR AS SOIL AMENDMENTS ON MARGINAL AND DEGRADED SOILS IN GUYANA



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## THE USE OF CHARCOAL AND BIO-CHAR AS SOIL AMENDMENTS ON MARGINAL AND DEGRADED SOILS IN GUYANA

In the Intermediate Savannahs, and the Hilly Sand and Clay regions of Guyana, agricultural crop production is conducted on marginal and degraded soils. Also, Guyana has large areas of mine-spoils resulting from bauxite and other mining operations, where reclamation through re-vegetation efforts is being pursued. In these regions productivity depends on precipitation and inputs of fertilizers.

Building and conserving healthy and resilient soil is one way farmers can optimize crop production and productivity.

Biochar and charcoal may be used as a soil amendment for improving the physical and chemical soil properties of marginal soils and in the re-vegetation of degraded lands as a carrier for beneficial soil microorganisms, for improved water holding capacity and soil aggregation, and cation exchange capacity. When used as a soil amendment biochar and charcoal has been reported to improve soil quality by raising soil pH and retaining nutrients in the soil because of its large surface area and porous nature.

Charcoal is defined as the thermochemical conversion from biomass (mainly but not exclusively wood) for energy generation whereas biochar are the charcoals produced for agricultural purposes, formed during the thermal decomposition of organic materials in the absence, or low supply of oxygen.

## CHARCOAL/BIOCHAR AS A CLIMATE CHANGE MITIGATION STRATEGY

Biochar can be considered an important tool for addressing a wide range of important challenges such as land degradation, climate change, food insecurity, waste management and sustainable energy generation.

Both charcoal and biochar have the ability to enhance soil fertility, productiveness and to mitigate climate change by sequestering carbon.

The inclusion of charcoal/biochar as a soil amendment in crop production is a strategy that leads to a net sequestration of carbon dioxide and possibly reduced emissions of more potent greenhouse gases such as methane and nitrous oxide.

### Use of Biochar and Charcoal to Improve Soil Fertility

Charcoal/biochar can be applied to acidic and infertile agricultural soils especially marginal and degraded soils where nutrient resources are scarce, as a valuable amendment for improving soil productivity and fertility.

Research done at NAREI in 2015 showed that the application of Rice Hush Bio-char at 2.5 kg/m<sup>2</sup> (25 t/ha) applied to a marginal soil (Tabela Sand), significantly increase soil pH, organic matter content, soil water holding capacity, exchangeable cations, nitrogen, phosphorous, and cation exchange capacity.



Production of cocnut husk biochar using the kilt

There was a 32.81% increase in plant biomass using 25 t/ha application rate in the first crop cycle compared to the control.

Research in both shade-houses and field trials have reported significant increases in crop yield following the use of charcoal or biochar as a soil amendment.

When using charcoal/biochar for re-vegetation and reclamation of mine spoil it is necessary to thoroughly mix the charcoal into the soil since it may be necessary to rebuild the entire soil.

