UNIVERSITY of GUYANA
URC22
Celebrating Creativity, Innovation and Invention
4th Undergraduate Research Conference
May 18 – 20, 2022
https://our.uog.edu.gy/
our@uog.edu.gy
@ouruog

A Preliminary Investigation into the use of Biochar as a Liming Agent

***Maywattie Mandai[1], Courtney Bullen[1]**

[1]Department of Agriculture. Faculty of Agriculture and Forestry. University of Guyana-Turkeyen Campus. Greater Georgetown, Guyana. *melissamandai24@gmail.com

Guyana's low-lying coastal plains support the majority of agricultural activities; however, this ecozone is prone to flooding. It was predicted that within the next five decades, all coastal arable lands would become saline, rendering agricultural production impossible. Therefore, the lesser used, less fertile, light-textured soils of the hinterland regions should be considered for crop production. However, these soils are characterised by relatively low pH, low nutrient retention, cation exchange, and water holding capacities. The traditional approach to liming involves the use of either calcium carbonate limestone or low-grade rock phosphate, both of which are imported and relatively expensive. Biochar, also referred to as agricultural charcoal, is a fine-grained, carbon-rich, highly porous substance obtained after the pyrolysis of organic biomass. This product is cheaper and has a pH ranging from 5.0 to 8.0. As a result, biochar is a promising soil amendment for sustainable agriculture in the hinterland regions, including the amelioration of soil acidity. This research sought to investigate the effectiveness of biochar to ameliorate light-textured soils to the extent of providing favourable conditions for the production of cowpeas. The experiment was carried out as a pot study and was arranged in a completely randomized design. The loamy sand used in this experiment had a pH of 6.4 and was obtained from the National Agricultural Research and Extension Institute (NAREI), Kairuni Station, Upper Demerara-Berbice (Region 10). Biochar produced from rice hulls and poultry manure was applied at rates of 25g, 50g, and 125g to 5kg of soil. There were eight treatments with replicates of three. The effects of biochar on the soil pH and cowpea performance were studied. The findings revealed that the average soil pH for the rice hull biochar treatments were 6.6, 6.7, and 6.9, whereas the average soil pH for the poultry manure biochar treatments were 6.9, 7.1, and 7.8, which may be due to the sheer alkalinity of biochar. Further, it was evident that there was no statistical significant difference in the mean days to 50% flowering [$F(7,16)=0.73$, $p=0.65$], there was a statistically significant difference in the mean days to 50% podding [$F(7,9)=7.64$, $p<0.01$], and there was no statistically significant difference in the mean plant height [$F(7,16)=1.55$, $p=0.22$] for the treatment groups. Additionally, there was a statistically significant difference in the mean number of pods per plant per treatment [$F(7,16)=7.44$, $p<0.01$], and there was a statistically significant difference in the mean grain yield per treatment [$F(7,16)=2.68$, $p=0.04$] for the treatment groups. It can be deduced that rice hulls and poultry manure biochar significantly improved the reproductive growth of cowpeas grown on the Kairuni loamy sand, but there were no significant differences in the vegetative growth of cowpeas. The research concluded that biochar can be instrumental in increasing soil pH in light-textured soils and can provide favourable conditions for crop production.

Keywords: Biochar, Cowpea, Loamy sand, Soil pH