The Potential of Plantain Wastes and Sargassum as Alternative Sources of Energy Production

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It has been estimated that mined coal supplies almost 30% of energy use worldwide, and is responsible for 44% of global CO2 emissions. Renewable and cleaner sources of energy utilizing biomass have been investigated in recent years, but the use of a blend of Sargassum species macroalgae and plantain agricultural waste has not been documented. This project aimed to produce and characterize heat the combustion byproducts of a novel bio-coal made from varying proportions of sargassum and plantain wastes. To achieve these goals the biomass was converted into charcoal through the process of pyrolysis. Five biomass blends of sargassum and plantain were studied (0% plantain, 25% plantain, 50% plantain, 75% plantain, and 100% plantain). The composition, physical properties and thermal stability of the samples were analyzed thorough different laboratory tests. The thermogravimetric (TGA) analysis revealed that of the three combinations, the proportion containing 50% plantain and 50% sargassum was the most heat stable. The energy dispersive detection (EDS) analysis also showed that it had no sulfur and low chloride content. The scanning electron microscopy images revealed that it had the highest surface porosity, which is desirable quality for other applications such as soil remediation. These findings support the hypothesis of this project. The results are very promising and suggest that further study of this novel bio-coal should be considered to determine if it results in a viable, environmentally cleaner, and cost effective alternative to mined charcoal improving the way we produce energy.

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