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“Bridging the gap between increasing knowledge and decreasing resources”

Hydrothermal Carbonisation of *Acrocomia aculeata* for the Production of Hydrochar and Activated Carbon

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Abstract

Macaúba palm (*Acrocomia aculeata* (Jacq.) Loddiges ex Mart) is a South American palm species used mainly as food and oil crop. The oil is extracted from the seed and the pulp, leaving the epicarp, endocarp and pressed cakes as residues. The aim of this study was to explore possible applications for these residues after a carbonisation process in a closed system and with high pressures. For achieving this, the different parts of the macaúba fruit as well as the pressed cakes were submitted to a 2-step hydrothermal carbonisation process to obtain a carbon-rich product (hydrochar HC), and study its potential as fuel and as feedstock for activated carbon. The HC obtained from all raw materials showed a high carbon content ranging between 25–120% due to a strong oxygen loss. This was reflected in a calorific value increase ranging from 30% for the hard inner shell to up to 50% for the biomasses with high oil content and pressed cakes. The H, N and S concentrations slightly varied during the carbonisation process. Based on the H/C and O/C ratios, the obtained HCs have a close resemblance to brown coal, however the ash content was lower and the energy content higher. The surface area increased by a factor of 5 compared to its parent material. Besides its value as a possible energetic source, the possibility of making activated charcoal using HC as precursor was also explored. To achieve this, the HC were submitted to a chemical activation. The activated carbons were characterised by means of BET analysis for measuring the surface area and SEM images.

Keywords: *Acrocomia aculeata*, activated carbon, hydrothermal carbonisation