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for sustainable resource management"

Characterisation of Macauba (*Acrocomia aculeata*) Kernel Proteins and Evaluation of their Solubility Properties

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Abstract

Macauba palm (*Acrocomia aculeata*), a perennial and fructiferous palm tree native to tropical and subtropical Americas and the extensive Macauba palm tree reservations in Brazil, is considered as a promising alternative for vegetable oil production. Its productivity is estimated to be from 2,500 to 5,000 kg of oil ha^{-1} y^{-1} and the oil from Macauba kernel is economically attractive due to the high content of short chain fatty acids. After de-oiling, the kernel meal offers a protein concentration between 30–50 %, thus highly suitable for the production of vegetable proteins. Hence, characterising the Macauba kernel proteins is imperative in order to develop an extraction process that promotes the sustainable use and the complete economical exploitation of this yet underexploited wild plant species.

The present work aims at the characterisation of the proteins from de-oiled Macauba kernel meal and the evaluation of their solubility properties under different extraction conditions. The findings showed that the globulins (salt soluble proteins) accounts for approximately 60 % of the total extractable proteins of Macauba kernel. Electrophoretic pattern performed by sodium dodecyl sulfate-polyacrylamide gel electrophoresis demonstrated that the Macauba globulins are mainly composed by the 7S (48.5 kDa) and the 11S (43.6 kDa) globulins. The isoelectric point of the 7S and 11S globulins, determined by two dimensional electrophoresis, ranged from 4.1–5.9 and from 3.3–6.8, respectively.

Minimum solubility of Macauba kernel proteins was observed at pH 4.0 with 10.9 % of protein recovery (PR). At low ionic strength 0.1 mol L^{-1} of NaCl), the maximum PR at pH 6.0–9.0 ranged from 25.6 to 31.2 %, whereas at higher salt concentration (0.50–0.75 mol L^{-1} of NaCl), PR increased to 64.8–73.1 % at same pH range. Protein extraction yields depend strongly on the properties of the different protein fractions present in the raw material, which can be separated by changing the conditions of the milieu. With the results herein described, it will be possible to design a process for extraction of the majority of the proteins available in the Macauba kernel meal. Furthermore, the present study also contributes to leverage the sustainable use of Macauba fruits, a renewable resource for diversifying feedstock and ensuring biodiversity.

Keywords: Acrocomia aculeata, globulins, Macauba, protein extraction, protein solubility, sodium dodecyl sulfate-polyacrylamide gel

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