

Chemical properties and fatty acid profile of macaw (*Acrocomia aculeata*) pulp oil obtained by aqueous enzymatic extraction

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Aqueous enzymatic extraction (AEE) of unexplored oil sources is an essential tool for food chain sustainability and bioeconomy. *Acrocomia aculeata*, also recognized as macaw palm, is an emergent oleaginous crop from South America with a high potential for the sustainable development of new food products. This study performed AEE with a commercial cellulase enzyme for oil recovery from macaw pulp. The extraction was performed in triplicate using 6.3% of the enzyme (regarding 60 g of pulp suspension: 30 g of pulp + 30 mL of buffer solution, 1:1 ratio) at 50 °C for 17 hours with constant agitation of 350 rpm. After the extraction, the reactive medium was centrifuged (13.500 rpm for 10 min), and the products were separated (free oil, cream emulsion, liquid, and solid fractions). The green process was evaluated by efficiency and oil quality (chemical and nutritional properties and fatty acid profile, FA). AEE and the control provided high free oil yields, $72.2\% \pm 3.5$ and $65.7\% \pm 1.8$, respectively. According to Codex Alimentarius (for traditional oils), low acidity (AEE: $1.01\% \pm 0.04$ and control: 0.88 ± 0.04 , oleic acid) was achieved for the extracted oil. In addition, the total carotenoids content and the iodine index value were $48.54 \pm 6.39 \mu\text{g g}^{-1}$ (control: $93.30 \pm 2.41 \mu\text{g g}^{-1}$) and $85.08 \pm 0.11 \text{ g I}_2 \text{ 100 g}^{-1}$ (control: $84.74 \pm 0.12 \text{ g I}_2 \text{ 100 g}^{-1}$), showing the presence of antioxidant compounds (carotenoids) and high unsaturated fatty acid content. The FA profile of macaw oil shows the predominance of unsaturated fatty acid in AEE ($74.64\% \pm 1.24$) and control ($71.11\% \pm 0.14$), with oleic acid (AEE: $72.35\% \pm 1.50$ and control: $68.06\% \pm 0.15$), the majoritarian compound. Furthermore, the oil presented excellent nutritional quality values in terms of atherogenicity and thrombogenicity indexes (AEE: 0.15 ± 0.01 and 0.33 ± 0.02 and control: 0.18 ± 0.01 and 0.39 ± 0.01 respectively), which could help to reduce cardiovascular risks. Thus, AEE is a green and sustainable approach for food industries to produce high-quality oil recovery from macaw pulp.