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COMPARATIVE EXTRACTION OF COSTIC ACID FROM Nectandra barbellata - CONVENTIONAL vs. SUPERCRITICAL CO_2 METHODS

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In alignment with the guidelines that regulate the limits of residual organic solvents in pharmaceutical products (ICH Q3C)[1], this study evaluated the environmentally friendly approach of supercritical CO_2 for the extraction of costic acid, a promising antiparasitic - against the protozoal *Trypanosoma cruzi* - sesquiterpene from *Nectandra barbellata* (Lauraceae)[2], comparing it to the conventional maceration technique. In the maceration process, 16 g of dried plant material were extracted with 50 mL of solvent (hexane or EtOH) in six successive steps. For supercritical extraction, the conditions of 47.5 °C and 35 MPa were selected based on prior experimental design. After solvents removal under vacuum, the total yield and the costic acid content, quantified by HPLC-DAD, were determined. The results are summarized in Table 1. Supercritical fluid extraction (SFE) exhibited better selectivity, achieving the highest concentration of costic acid in the extracts (450 mg/g). Its productivity was markedly superior to conventional extraction methods, reflecting enhanced process efficiency. This superior performance, combined with reduced use of organic solvents, aligns SFE with green chemistry principles and supports more efficient, sustainable, and environmentally friendly processes to obtain this bioactive compound.

Table 1: Comparison among the yield and costic acid content of *N. barbellata* aerials parts extracts obtained by SFE and maceration techniques.

Extraction method	Yield (%, d.b.)	CAC (mg/g extract)	CAC (mg/g RM d.b.)	Time (h)	Produtivity (g h^{-1})
SFE	4.0 ± 0.2	450	18.01	0.8	0.4655
HEX	5.2 ± 0.2	358	18.71	240	0.0034
EtOH	12.2 ± 0.4	318	38.84	240	0.0078

RM raw material, *CAC* costic acid content, *SFE* extract obtained using supercritical fluid extraction, *HEX* extract obtained using hexane (maceration), *EtOH* extract obtained using ethanol (maceration), *d.b.* dry basis.

Keywords: *Supercritical fluid extraction, costic acid quantification, green chemistry, sustainable extraction methods.*

References: [1]ICH Q3C(R9), 2024. [2]Londero, V. S. *et al*., *Bioorganic Chemistry*, **2019**, 95, 103510.
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