
**DESIGN OF EXPERIMENT APPLIED TO OPTIMIZATION OF
BIOACTIVE EXTRACTION FROM SPONDIAS TUBEROSA RESIDUE**

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Spondias tuberosa, commonly known as umbu, is a native species of the Caatinga biome. The processing of umbu for food purposes generates a significant amount of waste, accounting for approximately 60% of its fresh mass, mainly composed of fruit peel and pulp. These residues exhibit a high concentration of secondary metabolites, including flavonoids, tannins, and anthocyanins, which are known for their antioxidant activity and potential as cosmetic raw materials. This study aimed to optimize the extraction of these compounds from umbu residues using a Design of Experiment (DOE). A 2⁴ factorial design was applied, assessing the independent variables: extraction method (turbulysis or ultrasound), solvent (water or 50% v/v ethanol), residue type (fresh or dried), and extraction time (5 or 15 minutes). The response variables included extraction yield, antioxidant activity determined by the DPPH assay, and flavonoid quantification (FQ), evaluated during both screening and optimization stages. The results indicated that dried residue and 50% ethanol were superior across all assays, while turbulysis was identified as the most efficient extraction method. The outcomes ranged as follows: extraction yield from 0 to 23.8 mg/mL, antioxidant capacity from 14% to 90%, and FQ from 1.10 to 23.50 µg QE/mg. Overall, the findings highlight the potential of *Spondias tuberosa* residues as a valuable source of bioactive compounds for cosmetic formulations, contributing to the valorization of by-products and the advancement of sustainable practices within the production chain.

Keywords: Extraction, Residue, *Spondias tuberosa*

