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BIOCATALYTIC APPROACHES TO WASTE VALORIZATION: ANTI-AGING AND ANTIOXIDANT ACTIVITIES FOR ACYLATED CITRUS DERIVATIVES

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The process of skin photoaging, driven by the production of reactive oxygen species, leads to collagen degradation and the appearance of wrinkles. This study primarily aims to utilize waste from the citrus juice industry, rich in flavonoids, which exhibit anti-aging action due to their antioxidant capacity and inhibition of metalloproteinases, such as tyrosinase, important in the melanogenesis process. The application of these substances is limited due to their high hydrophilicity. To enhance their action, this project proposes the enzymatic synthesis of acylated derivatives of these extracts (Tundis et al., 2015), aiming for more hydrophobic matrices. The extraction of each part of the peels (albedo and flavedo of *Citrus sinensis*) was performed by static maceration at room temperature using EtOH:H_2O (8:2) as solvent system, stored for 24 h. Hesperidin and the crude extracts from albedo and flavedo were acylated by transesterification reaction using 22.5 mg of each sample in 1.5 mL of vinyl ester; 0.5 mL of solvent (isopropanol for esters with C2 to C4 carbon chains or *tert*-butanol for esters with C10 and C12 carbon chains). The reaction mixture was placed in an orbital shaker (60 °C – 180 rpm) for 5 min, and then 9 mg of the commercial enzyme N435 (40% relative to the substrate amount) was added for reactions with C2 to C4, and 22.5 mg of N435 (100% relative to the substrate) for reactions with C10 and C12 carbon chain esters. The crude extracts and the corresponding derivatized extracts, as well as commercial pure compounds annotated by mass spectrometry as majority in the extracts, such as hesperidin, quercetin, pectin and rutin, are being submitted to tyrosinase enzyme inhibition assays at concentrations ranging from 2 to 2000µg/mL, according to the protocol established by Khatib et al. (2005), using the SpectraMax iD3 multimode microplate reader. The flavedo extract showed 20% inhibition at a concentration of 200µg/mL, compared to 81% for the control kojic acid at the same concentration. Hesperidin, found in majority in *Citrus* extract, showed a potential of 30% inhibition also at 200µg/mL.Studies are underway to determine the IC50 of the extracts and acylated derivatives, aiming to increase the inhibitory potential against the anti-aging enzymes. Antioxidants assays are also in progress. The author acknowledges the support of UFRJ, FAPERJ, CNPq, and CAPES.

Keywords: *Acylation, antioxidant, biocatalysis Citrus, tyrosinase*

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