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A PHYSICAL AND DIGITAL PLATFORM FOR THE VALORIZATION OF BOTANICAL ASSETS FROM AGRO-INDUSTRIAL BY PRODUCTS

Adriano Souza Fonseva[1*], Vitor Rossini[1], Isabel Duarte Coutinho[2], Ian Castro-Gamboa[1]

adriano.s.fonseca@unesp.br

1-NuBBE, Instituto de Química, IQ-Araraquara, UNESP, Av. Prof. Francisco Degni, 55 - Jardim Quitandinha, Araraquara - SP, Brazil. 2-Natcrom Soluções Sustentáveis, Av. Jorge Fernandes de São Mattos, 311 - BOX 03 - 8º Distrito Industrial, Araraquara - SP, Brazil.

Food waste is a global challenge, with agro-industrial byproducts, such as fruit peels and seeds, often being discarded despite their high nutritional and bioactive value. In Brazil, where approximately 30% of food is wasted, the valorization of these residues is crucial for sustainability. This project's main objective was to develop a physical and digital platform for the prospecting and identification of botanical assets from fruit cultivation byproducts in the Araraquara region, SP. The methodological work was divided into three phases. Initially, a diagnosis of fruit farming residues in the Araraquara Region (comprising 16 municipalities) was carried out, based on information from technical document 128 of CATI-SP and Embrapa Cassava and Fruit Farming. Although data analysis identified oranges (83%) and bananas (7%) as the most economically significant crops, the initial chemical prospecting focused on pineapple (0.85%) and passion fruit (0.21%) byproducts. All data collected were systematized into standardized technical sheets. Subsequently, samples of these byproducts were processed and subjected to Soxhlet extraction. The obtained extracts were then analyzed by UPLC-MS and GC-MS. As the main result, a digital platform with a graphical user interface in Python (Tkinter) was developed, functioning as a library for chromatographic and spectral data. The system allows for data importation, searching for compounds by name, formula, or mass, and comparing experimental spectra with internal and external databases, such as MassBank. The platform proved to be a versatile tool, enabling not only the identification of compounds but also the management of a mapped chemical library for each fruit and the quantitative analysis of key substances. This facilitates the conversion of waste into standardized, high-value ingredients for the food, cosmetic, and pharmaceutical industries. The project contributes to the circular economy and is aligned with multiple Sustainable Development Goals (SDGs).

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