

FROM ORANGE WASTE TO CHEMICALS: CONTRIBUTIONS OF AN INTEGRATED BIOREFINERY APPROACH TOWARDS SUSTAINABLE DEVELOPMENT IN BRAZIL

There is a pressing need for renewable and optimal uses of resources towards sustainable primary production and processing systems worldwide. In this context, the biorefinery integrates facilities for the conversion of biomass into multiple value-added products, to create flexible, zero waste networks. Using a variety of low value local feedstocks and also, contributing significantly to a bioeconomy. The main objective of this collaborative project is to strengthen the research network between the Green Chemistry Centre of Excellence (GCCE, the University of York, UK) and the Natural Products Research Group (NPRG, Federal University of São Carlos, Brazil) around Brazilian citrus chain valorisation based on the biorefinery and green chemistry concepts. A techno-economic and environmental assessment of the whole Brazilian citrus chain will be performed using methods developed by the SEI green-economy group (e.g. Life Cycle Assessment, LCA), encompassing food, energy, water, environmental and social impacts. According to previous data obtained by both groups, there is a wide spectrum of extractable compounds from orange waste with huge possible marketable applications (flavonoids, pectin, cellulose, d-Limonene, α -terpineol, waxes, alkanes, sugars, among others that can be used as additives of personal care products, flavour and fragrances, cosmetics, nutraceuticals, bio-solvents, biopolymers and active ingredients for insect repellents), as well as a number of green methods and techniques which can be employed in lab- and large-scale processes. The integrated (biorefinery approach applied to citrus waste needs to be further explored and advanced, considering the Brazilian economic, scientific, social and environmental characteristics. In this project, the events (workshops, conferences, courses, lectures and scientific meetings) and short-research stays planned are of ultimate importance to build long-term partnership between the GCCE and NPRG groups, which are considered as references in

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their areas of expertise all over the world (e.g., green technologies and waste valorization in the UK as well as the development of alternatives to promote sustainable agriculture in Brazil) and the creation of links between them will impact markedly the present and future actions and research proposals on orange waste exploitation, contributing to sustainable development in Brazil. This innovative initiative will also permit the creation of a new Centre of Excellence in Green Chemistry and Sustainability based in São Carlos (SP), a full member of the Global Network of Green Chemistry Centres (G2C2), in order to promote and deepen the dialogue between the academia, government and industry sectors, helping to constitute a better equipped community to develop excellent research outcomes and related activities around strategic topics in Brazil.