Oxydized lipids

Oxydized lipids derivatives in coffee plant, SENS roasted coffee and its by-products

ABSTRACT

Coffee is one of the most widely traded agricultural commodities in the world. Sustainable strategies to address the significant amounts of agro-wastes and by-products derived from the Mexican Arabica coffee (Coffea arabica L.) wet processing (pulp, parchment skin, mucilage, silverskin, exocarp, low-grade green coffee), have become a major challenge, as they represent a serious disposal problem in both producing and processing countries. It exists a growing awareness on upcycling coffee by-products or on using them as interesting and cheap renewable source of bio-molecules exhibiting interesting physicochemical and/or biological activities, which can be used in the formulation of food and non-food products. Among these bio-molecules, we can cite the non-enzymatic oxylipins such as phytoprostanes (PhytoPs) and phytofurans (PhytoFs), which are formed by non-enzymatic oxidation of α-linolenic acid. PhytoPs and PhytoFs possess interesting biological activities and represent relevant oxidative stress biomarkers in plants. There is an increasing interest on the research of the molecular profile and amount of these compounds in plant foods and their response to cultural and postharvest transformation practices and/or environmental conditions. We have recently reported for the first time the presence of PhytoPs and PhytoFs in coffee pulp. We hypothesize that the coffee plant and other by- and final products derived from coffee primary and secondary transformation process, could be valuable sources of PhytoPs and PhytoFs.

The ambition of this project is to investigate the qualitative and quantitative profile of the oxidized lipids derivatives (PhytoPs and PhytoFs) and their response to cultural and postharvest transformation practices on the Mexican Arabica coffee plant and cherry.

Two French (UMR QualiSud and IBMM-SLB in Montpellier) and one Mexican partner (TNM-ITV (Veracruz), possessing a wide range of complementary expertise, will participate in this project, which is organized in three work packages (WP): WP0: Project coordination, WP1: Coffee transformation chain analysis and collection of samples, WP2: Study of the chemical evolution of lipids and PhytoPs and PhytoFs during the coffee plant growth and coffee transformation, and WP3: Knowledge sharing and advancing the co-ownership.

This project will contribute: (i) to build an international collaboration and to promote a crosscutting learning between academic and non-academic actors (coffee farmer and processor) and researchers from different disciplines (Food Technology, Chemistry, lipidomics, Microbiology, Biochemistry) , (ii) to enrich the identification of high added value molecules present in coffee plant, in coffee products and their sustainable by-products, and (iii) to diversify the Mexican Arabica coffee by-products uses, that will reduce their negative impact and that will create an additional income for Mexican coffee farmer and coffee processor.

Keywords : Arabica coffee, By-products, Oxidized lipids derivatives, Valorization, Phytoprostanes and phytofurans

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GOAL

The overall ambition of this interdisciplinary project research is to contribute to improve the sustainability of the Mexican Arabica coffee supply chain by directly working with their actors (local coffee farmer and processor), in order to add value to the high environmental impact by-products derived from the primary and secondary coffee processing. For this, we will work in collaboration with Mexican academic scientists from the Instituto Tecnológico de Veracruz (Veracruz, Mexico) and with actors of the coffee production and transformation chain in the state of Veracruz in order to investigate the qualitative and quantitative profile of the oxidized lipids derivatives (PhytoPs and PhytoFs) and their response to cultural and postharvest transformation practices on the Mexican Arabica coffee plant and cherry. The attended results will enrich the characteriztaion and portfolio of high added value molecules present in green and roasted coffee, along with its by-products