

Optimization of a new circular agriculture model for the olive-oil sector applicable to food, cosmetic and nutraceutical fields

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Circular economy means an innovative strategy for optimizing the use of available resources according to which the end products of a phase of production become materials of starting for a subsequent stage, resulting to a cyclic system. This strategy, which tends to zero the production of waste, it can be advantageously applied in agro-industrial and food processes, using vegetable by-products and wastes of production for obtaining, in a sustainable way, bioactive molecules, new products and energy.

In this work we will be considered two different macro-objectives:

- The valorization of extravirgin olive oil as a nutraceutical;
- Optimization of a new circular agriculture model for the olive oil sector applicable to food sectors, cosmetic and nutraceutical.

In this study we have investigated biophenols and volatile compounds of monovarietal and blended extravirgin olive oils (EVOOs), in order to optimize both the qualitative and quantitative characteristics of oil and both the organoleptic properties. Biophenols characterization was performed by HPLC-DAD-MS technique. The unique and delicate EVOO flavor depends on the interaction of hundreds of compounds and EVOOs were also analyzed by GC-MS and 2DGC-MS. HS-SPME-GC×GC-TOF-MS analysis of the complex volatile fraction of EVOO was submitted to advanced fingerprinting analysis of 2D chromatographic data.

Another objective was to propose models of "circular economy" aimed at the production of new formulations with antioxidant and antimicrobial activity from the olive by-products and wastes such as leaves and olive residues obtained from two-phase process. After optimization of experimental and industrial solvent-free extraction processes and fractionation, the fractions have been characterized by HPLC-DAD-MS, to characterized the qualitative and quantitative presence of biophenols. The standardized fractions were used for innovative application in food, cosmetics and agricultural fields, in association with other standardized polyphenolic fractions useful as antioxidant and antimicrobial. This work is supported by TUSCANY NATURBEN project.

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