APPLICATION OF INNOVATIVE TECHNOLOGIES FOR THE RECYCLING OF AGRI-FOOD WASTE - H2020 AGRO2CIRCULAR AND AGROMATTER PROJECTS

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In Europe, fruits and vegetables (F&V) are the higher contributor to the food wastes (>40%). These food wastes are an excellent source of natural bioactive compounds and are not being exploited.

Considering the changes in production models towards a circular economy to improve the sustainability of the food industry and the environmental problems involved in the management of its waste, there is currently a growing interest in the recovery of these agri-food by-products to obtain valuable compounds for food, cosmetic or pharmaceutical applications, among others.

Nevertheless, conventional methods of extracting bioactive compounds are inefficient (low yields and purity) and unsustainable.

OBJECTIVE
The objective of *Agro2Circular* is valorisation of agri-food waste through green extraction routes (innovative) to obtain bioactive compounds economically viable for industrial implementation, to produce new nutraceuticals, functional foods and cosmetics formulations.
Agromatter aims to establish a network for the development of highly sustainable technical materials derived from by-products of the agri-food industry

METHODOLOGIES
For the valorisation of different agri-food waste (broccoli, cauliflower, apple, lemon, grape and artichoke), different extraction, purification and stabilisation routes have been optimised. Green solvents (aqueous solvents, natural deep eutectic point solvents (NADES), enzymatic solutions, subcritical water (SWE)) have been used for this purpose.

Assistive technologies to improve extraction yields (ultrasound (UAE) and microwave (MAE)) have also been evaluated. Subsequently, purification (resins, membranes) and stabilisation (atomisation, freeze-drying, encapsulation) technologies have been used.

RESULTS
In general, enzymatic extraction has provided the best results in fibre extraction. However, of the agri-food waste studied, artichoke waste treated by ultrasound-assisted aqueous extraction (UAE) showed the best results for the extraction of dietary fibre, improving enzymatic extraction by 12%. Broccoli waste has followed artichoke in terms of fibre extraction yields.

Lemon waste extracted by subcritical water extraction have provided the best results in the extraction of phenolic compounds, with hesperidin and limonin being the major compounds. SWE has improved the aqueous extraction by up to 340%. Secondly, artichoke residue extracts were the richest in phenolic compounds, with 1,5-O-dicaffeoylquinic acid (cynarine) and chlorogenic acid predominating.