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Introduction

Among the most important issues that concern safeguard and environmental protection, today there is the theme of sustainability. Food companies and institutions have worked to develop strategies to reduce pollution and manage the scarce resources more equitably. In this context, the exploitation of waste and by-products from the food industry has recently assumed strategic importance (Troilo et al., 2021). Another strategy is to develop green analytical methods for qualitative food analysis (Casson et al., 2020).

State of the Art

The wine and oil supply chains are among the most important in the Apulian territory and contribute to the production of numerous waste such as shoots (Fig. 1A), marc, stalks, leaves, pomace and vegetation waters. Several studies show that food wastes and by-products are rich in bioactive compounds, such as phenolic compounds, stilbenes (Fig. 1B) that can act as stabilizing agents, antimicrobials and antioxidants. Thanks to these properties, these compounds can be recovered and used in various sectors such as the food and pharmaceutical industry (Difonzo et al., 2021). Other studies confirm how bioactive compounds can increase the quality and safety of food and inhibit the formation of some harmful substances that are formed during normal production processes (Urbančič et al., 2014).

PhD project

Therefore, the PhD project aims to test the applicability of sustainable technological approaches to improve the quality and safety of selected food products. The project will proceed i) at the production stage, through the use of natural extracts rich in bioactive compounds, obtained from by-products of the main regional supply chains (oenological and olive oil sectors), for the improvement of quality and the reduction of harmful substances, with particular reference to acrylamide; ii) at analytical level, through the application of green analytical technologies, such as NIR spectroscopy, for the rapid and non-destructive assessment of the quality of raw extracts and food, and for the determination of emerging contaminants (Porep et al., 2015; Qu et al., 2015).

A



B

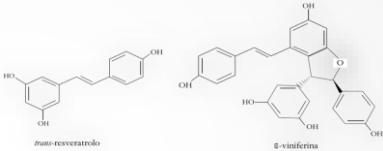


Fig. 1 - Example of agri-food waste (Vitis Vinifera L. shoots) (A) and bioactive compounds (stilbenes: trans-resveratrol and 6-viniferin) (B).

Tab. 1 - Gantt diagram indicating the activities of the PhD project

Activity - Months		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
A1	Bibliographic research																								
A2	Sustainable technological approaches for the valorisation of by-products of food industries																								
	T1 - Extraction and characterization																								
	T2 - Use in food systems																								
	T3 - Evaluation of the shelf-life of enriched foods																								
A3	Sustainable technological approaches for food quality and safety																								
	T1 - Development and application of green methods for by-products																								
	T2 - Development and application of green methods for food																								
	T3 - Monitoring of emerging contaminants																								
A4	Data elaboration, writing and editing																								

References:

Casson A, Beghi R, Giovenzana V, Fiorindo I, Tugnolo A, Guidetti R (2020) Environmental advantages of visible and near infrared spectroscopy for the prediction of intact olive ripeness. *Biosyst Eng* **189**: 1-10.

Difonzo G, Aresta A, Cotugno P, Ragni R, Squeo G, Summo C, Massari F, Pasqualone A, Faccia M, Zamboni C (2021) Supercritical CO2 Extraction of Phytocompounds from Olive Pomace Subjected to Different Drying Methods. *Molecules* **26**: 598.

Porep JU, Kammerer DR, Carle R (2015) On-line application of near infrared (NIR) spectroscopy in food production. *Trends Food Sci Technol* **46**: 211-230.

Qu JH, Liu D, Cheng JH, Sun DW, Ma J, Pu H, Zeng XA (2015) Applications of near-infrared spectroscopy in food safety evaluation and control: A review of recent research advances. *Crit Rev Food Sci* **55**: 1939-1954.

Troilo M, Difonzo G, Paradiso VM, Summo C, Caponio F (2021) Bioactive Compounds from Vine Shoots, Grape Stalks, and Wine Lees: Their Potential Use in Agro-Food Chains. *Foods* **10**: 342.

Urbančič S, Kolar MH, Dimitrijević D, Demšar B, Vidrih R (2014) Stabilisation of sunflower oil and reduction of acrylamide formation of potato with rosemary extract during deep-fat frying. *LWT - Food Sci Technol* **57**: 671-678.

