



Application of functional molecules recovered from bergamot by-products: development and improvement of food systems

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STATE OF THE ART

Citrus Bergamia Risso, named "Bergamotto", is cultivated exclusively in Calabria area and represents a niche crop known all over the world, that has been little studied and of increasing interest. Its transformation generates considerable quantities of by-products, which includes peels, seeds and pulps. Citrus peel possibly becomes a source of economic and environmental problems because of fermentation and microbial spoilage processes (Safari & Karimi, 2018). It is a significant source of bioactive compounds, such as polyphenols with high antioxidant activity, enzymes, vitamins, fibre, and other compounds that can be recovered with different methodologies and innovative techniques (Mahato et al., 2019). They're used as functional ingredients to improve functional capacities and products stability in food application/systems. Moreover, functional compounds could be microencapsulated improving stability of phenolics trapping them within a microscopically large coating layer or matrix to protect the coated materials from adverse reactions and promote the controlled release of the encapsulates (Nguyen et al., 2021). Another use to valorize citrus by-products is its application in active packaging (Mellinas et al., 2020), incorporating biomolecules into edible films or coatings, that are developed from ingredients environmentally friendly, reducing the deleterious effects imposed by processing on fresh-cut fruits and vegetables (Maftoonzad & Ramaswamy, 2019) and extension food shelf life in general.

PhD THESIS OBJECTIVES AND MILESTONES

RECOVERY AND PURIFICATION OF BIOACTIVE COMPOUNDS

- A1) Recovery and purification of bioactive compounds;
- A2) Analytical characterization of bioactive compounds;
- A3) Design and development of different food products:
 - Formulation of a super-ingredient (butter and/or margarine);
 - Preparation of bakery products with flours;
 - Microencapsulation of antioxidant compounds;
 - Formulation of edible coating;
- A4) Evaluation of physicochemical, microbiological and functional properties of new formulated products;
- A5) Data processing;
- A6) Thesis and paper preparation.



Gantt Diagram for this PhD thesis

Activity	Months	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30	31-32	33-34	35-36
A1) Recovery and purification of bioactive compounds													
A2) Analytical characterization of bioactive compounds													
A3) Design and development of different food products													
- super-ingredient (butter and/or margarine)													
- bakery products													
- microencapsulate													
- edible coating													
A4) Evaluation of physicochemical, microbiological and functional properties of new formulated food													
A5) Data processing													
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EXPECTED RESULTS

- Valorization of bergamot pomace
- Recovery of bioactive compounds to use in different food applications
- Improvement of functional products with improved antioxidant properties and shelf life
- Functional flour for use in bakery products

References

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