

Biotechnological valorisation of residues and by-products from agro-food industries

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State of the art

- § Food processing industry problem → generation and management of **high quantities** of **wastes & by-products**
- § By-products → undervalued substrates rich in **functional** and **bioactive components** [1]
- § **Possible valorisation strategies** → i) **recovery/extraction** of valuable components; ii) **bioprocessing** into value-added products by selected **microorganisms**
- § Food industry need → **extend food shelf-life** and satisfy **consumers' demand for safe, healthy and fresh-like foods**

PhD Thesis Objectives & Milestones

- ❖ Agro-food by-products **characterisation** → functional properties, i.e. antimicrobial, antioxidant, prebiotic activity
- ❖ **Selection** of yeasts and LAB **strains** for **fermentation processes** → increase of the by-products' bioactivity
- ❖ Use of the functional by-products → as food **functional ingredients**
→ as components of **active edible coatings**

Main PhD project activities according to the Gantt diagram:

A1) **Functional characterization of the by-products** for:

- I) prebiotic, antioxidant and antimicrobial activities
- II) technological features, e.g. gelling, foaming and water binding capacity

A2) Yeasts/LAB strain selection and **by-products valorisation through fermentation** processes

A3) **Food formulation with functional by-products**: evaluation over storage of the effects on microbiological, quality, nutritional and functional properties of foods

A4) **Production of active edible coatings**:

- I) films formulation by inclusion of the functional by-product(s);
- II) films characterisation for their chemico-physical properties

A5) **Tests on foods coated with the active edible films**: packaging of different categories with the developed material and analyses over storage. Shelf-life assessment and comparison with uncoated foods/reference conventional packaging

A6) **Writing and Editing** of the PhD thesis, scientific papers and poster/oral communications

	Activity/ Month	2	4	6	8	10	12	14	16	18	20	22	24
A1)	Functional characterization of the by-products												
	1) Antimicrobial/antifungal activity												
	2) Antioxidant activity												
	3) Prebiotic activity												
	4) Technological feature analysis												
A2)	By-products valorisation through microbial fermentation												
A3)	Food formulation with functional by-products												
	1) Soft cheese												
	2) Fermented milk												
	3) Bakery product												
A4)	Production of active edible coatings												
	1) Active edible coating formulation												
	2) Technological characterization												
	3) Functional characterization												
A5)	Tests on foods coated with the active edible films												
	1) Meat product(s)												
	2) Fruits and vegetables												
	3) Bakery product												
A6)	Thesis and Paper Preparation												

Reference:

[1] Mejri F, Selmi S, Martins A, Benkhoud H, Baati T, Chaabane H, Nijm L, Serralheiro MLM, Rauter AP, Hosni K (2018) Broad bean (*Vicia faba* L.) pods: a rich source of bioactive ingredients with antimicrobial, antioxidant, enzyme inhibitory, anti-diabetic and health-promoting properties. *Food Funct* 9(4): 2051–2069.