Corso di dottorato in Food Science and Human Nutrition, XL ciclo



Regenerative upcycling food bio-technologies for busting the Mediterranean food system's circularity

Dott.ssa Federica Zannini

Laboratorio di microbiologia alimentare, industriale e ambientale

Tutor: Prof.ssa Francesca Comitini, co-Tutor: Prof.ssa

Background

Several Mediterranean agri-food side streams have a nutritional composition with encrypted potential functional and bioactive properties. They are rich in nutrients but are usually underutilised, and generally under, creating different ecological problems.

Materials and Methods

- Selection of suitable agro food side streams;
- solid state fermentation (SSF) setup using edible mushroom *Pleurotus ostreatus;*
- liquid state fermentation (LSF) with probiotic yeasts like Debaryomyces hansenii, Lachancea thermotollerans, Starmerella spp 18, and Saccharomyces boulardii;
- innovative food and beverage formulations

Maria Elena Lionetti

The aim of this PhD is to identify the different process steps (like pretreatment, volume reduction, phase change, solid removal, purification, and formulation) required to recover high-value products from agri-food residues.

The convertion of agri-food side stream coming from Marche region crops into **high-added-value** and low-cost food **ingredients** is the challenge to formulate healthy and innovative foods and beverages.







Burning



Preliminary Results

1) Evaluation of the best combination of agro food side streams for the growth of *Pleurotus ostreatus* during SSF

	М	wheat straw (15%) sawdust (15%) blackberry wastes (70%)	+
	Т	wheat straw (15%) sawdust (15%) brewery spent grain (70%)	+
	С	wheat straw (15%) sawdust (15%) spent coffee grounds (70%)	+++
i –			

2) Set-up of chemical-physical conditions

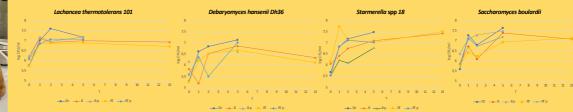
	Condition	Growth
i i	No air flow, dark, humidity of	+
	70%, Temperature 25 C°	
	Constant air flow, dark,	+++
	humidity of 70%, Temperature	
	25 C°	





3) Evaluation of the survival of probiotic yeasts in LSF of a liquid apple wastes infusion





REFERENCES: Improved lignocellulolytic enzyme production and antioxidant extraction using solid-state fermentation of olive pomace mixed with winery waste, 2019, Zahid, H.F.; Ranadheera, C.S.; Fang, Z.; Ajlouni, S. Utilisation of Mango, Apple and Banana Fruit Peels as Prebiotics and Functional Ingredients. Agriculture 2021, 11, 584, Cantatore, Vincenzo, et al. "Lactic acid fermentation to re-cycle apple by-products for wheat bread fortification." Frontiers in Microbiology 10 (2019): 2574.