

**BioTech Research  
& Innovation Hack**

**2021**

# ERA CoBioTech Funded Projects at A Glance: RHODOLIVE

Biovalorization Of Olive Mill Wastewater To Microbial Lipids And Other Products via *Rhodotorula Glutinis* Fermentation

PART OF

**EUROPEAN  
BIOTECH  
WEEK**



INNOVATION IS IN OUR GENES

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**Project duration:**

01 June 2018 - 31 May 2021

**Total budget:** 2 €M

## RHODOLIVE

### Biovalorization of Olive Mill Wastewater (OMW) to Microbial Lipids and Other Products via *Rhodotorula glutinis* Fermentation

*The main objective of our project is to develop a sustainable bioprocess for OMW bioremediation with R. glutinis in order to produce high value-added bioproducts; such as carotenoids, bioactive phenolic compounds, lipids etc.*

#### To use of olive mill waste water for cost free yeast production medium

Olive mill wastewater (OMW) is a significant by-product of the food industry of the olive oil producer countries in Mediterranean basin, with a high environmental impact, when not appropriately treated. However, at the same time OMW is rich in organic compounds, which can either be used directly after extraction, or valorised via biocatalytic processes. RHODOLIVE suggests an innovative circular bioeconomy approach for the valorisation of this side-stream of the food industry, by treating the OMW with a non-conventional yeast, in order to accumulate and produce microbial lipids, biophenols and carotenoids, which will be used in the development of functional food products. Fungi and algae cultivation: Re-evaluating (OMW) the effluent from *R. glutinis* fermentation with filamentous fungi and micro-algae. Cultivation and co-cultivation of filamentous fungi and microalgae in the (OMW) effluent after *R. glutinis* fermentation. Bioinformatic: Modelling and model based optimization of *R. glutinis* metabolism.

Modifying and producing *R. glutinis* strains for several objectives (different strains for each objective): i) phenolic degradation (mainly biomass production), ii) carotenoids production, iii) lipids production iv) hydroxytyrosol production.

#### Approach

Bioprocess: Setting up a pilot-scaled (30 L) bioreactor system for producing biomass and fermented OMW effluent.

Investigating the total biomass, microbial lipid, protein and carotenoid production rates and fatty acid profile changes with temperature and pH in the pilot system. Defining the optimal process conditions for producing the total biomass, carotenoids, lipids and proteins, explaining FAME composition variation with medium temperature and pH for *R. glutinis* cultured in (OMW) medium. Downstream processing: Developing a green extraction system for purification lipids, carotenoids and proteins from the yeast grown in OMW. Identify the optimal extraction processes and conditions for value-added yeast products, particularly for carotenoids, lipids and proteins. Food engineering: Evaluating yeast products obtained for application in food industry

Specifying the physico-chemical and sensory properties of isolated yeast products. Food products preparation from yeast components.

Increasing the acceptancy degree of yeast products by the community

#### Main results

RHODOLIVE is developed and set up a pilot bioreactor system (pH-state continuous) and showed that OMW is a very promising medium for *R. glutinis* cultivation and simultaneously maintaining biological treatment of OMW. Rhodolive also showed that, in OMW medium *R. glutinis* is producing higher amount of antioxidants, carotenes and poly-unsaturated fatty acids in comparison with synthetic media such as UYM and etc..

#### Future prospect

In the next step, our aim is to industrialize the OMW fermentation system by *R. glutinis* and with other microorganisms, those have huge economic potential. We already start up a new company for anti-aging cosmetic substances production. The bioprocessing system is also considered to be a product.





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Figure 1: Pilot plant bioreactor system Rhodin, established in RHODOLIVE



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Figure 2: The RHODOLIVE team

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