RETASTE Conference Abstracts
RETASTE-APP-1416-In-person Poster
Rethymno, September 16-18, 2026
© Author(s) 2026 CC BY 4.0 License
DOI:10.5281/zenodo.23678127

Valorization of Whey Permeate by Filamentous Fungi to Produce Valuable Mycoproducts

V. Samioti[1], K. Bencomo-Garcia[1], I. Kantzias[1], S. Vlachou[1], G. Vasilakis[1], S. Papanikolaou[1], P. Diamantopoulou[2] and G. Bekiaris[1]

[1]*Agricultural University of Athens, Athens, Attica, 11855, Greece*
[2]*Institute of Technology of Agricultural Products, Hellenic Agricultural Organization—Dimitra, Athens, Attica, 14123, Greece*

ACCEPTED

Abstract

The dairy industry provides a variety of products being highly accepted worldwide, but the cheese-making practice leads to the production of cheese whey, as the main by-product. Only in Europe 52.2 million tons of the highly pollutant by-product were produced in 2023. Whey permeate, also called Second or Secondary Cheese Whey (SCW) is the deproteinized by-product resulting from the production of whey cheeses, such as Mizithra, Ricotta, or Anari. Due to its high nutrients load, it can be an adequate, low-cost substrate for microbial cultures. Basidiomycete and Zygomycete filamentous fungi are widely recognized for their ability to produce value-added products, including mycoprotein, beta-glucan-rich biomass, and lipids rich in polyunsaturated fatty acids. The aim of this study was the evaluation of the ability of specific fungal species, i.e., *Hericium erinaceus*, *Umbelopsis (Mortierella) ramanniana*, and *Cunninghamella elegans* to grow on whey permeate. Initial cultivations included commercial semi-defined lactose-based substrates (30 g/L) and nitrogen-excess (C/N =20 mol/mol) conditions. Based on the results of the batch-flask cultures, *H. erinaceus* AMRL 373 completely assimilated lactose and produced 19.0 g/L for dry biomass, containing proteins at 15% (w/w) and polysaccharides at 43% (w/w). *U. ramanniana* MUCL 9235 produced 15.6 g/L dry biomass, proteins at 32% (w/w) and lipids at 22% (w/w), while *C. elegans* NRRL Y-1392 could not catabolize lactose. Both successfully grown strains were afterwards cultivated on whey permeate (lactose ≈52 g/L– C/N ≈28 mol/mol) in bioreactor system, without the addition of extra nutrients. During the bioreactor cultivation of *H. erinaceus*, 24.0 g/L of dry biomass were produced after 8 days, containing 4.0 g/L of protein composed of the essential amino acids leucine at 7% (w/w of total amino acids), and valine, phenylalanine at 5% (w/w) each, among others. *U. ramanniana* consumed 23.6 g/L of lactose after 6 days, yielding 7.9 g/L dry biomass, containing 28% (w/w) of protein and 27% (w/w) of lipids. Overall, both strains could be significant candidates for the valorization of whey permeate leading to the reduction of environmental footprint and the production of high-value metabolic compounds.

Keywords: cheese whey, filamentous fungi, mycoproducts, alternative proteins, circular economy

Acknowledgments: This study was part of the project APRISE, funded by the European Union's ERA Talents Programme under Grant Agreement No. 101216976.