Fungi with medicinal properties isolated from Kefalonia and Zante islands: Growth behavior on different carbon sources

V. Poulios[1], A. Papadaki[1], V. Kachrimanidou[1], M. Triantafyllou[2], E. Magdalinou[2], I.K. Lappa[1], Z. Gonou-Zagou[2], N. Kopsahelis[1,*]

[1]Department of Food Science and Technology, Ionian University, Argostoli, 28100, Kefalonia, Greece
[2]Department of Ecology and Systematics, Faculty of Biology, National and Kapodistrian University of Athens, Athens, Greece
Keywords: fungal biodiversity, macrofungi, microfungi, biomass, functional properties
Presenting author email: kpapadaki@ionio.gr,
[*]Corresponding author email: kopsahelis@ionio.gr

Abstract

Macro- and micro-fungi play an essential ecological role as decomposers, while some of them are considered important nutrient-rich food. Additionally, many fungal species are highlighted for their medicinal value, exhibiting antimicrobial, antiviral, antioxidant and antitumor properties. Likewise, overharvesting of macrofungi, not only disturbs the ecological balance but also reduces mushroom populations. The Fungal Red List, launched in 2013, highlights the importance of conserving fungi. In this context, the fungal biodiversity in certain regions of Kefalonia and Zante islands have been studied, targeting to identify and conserve fungal species. Fungal growth behavior, in various carbon sources, is an essential step prior to any attempt to utilize alternative and renewable substrates towards the sustainable *ex situ* fungi production and conservation.

In this study, three mushrooms belonging to *Phellinus* sp., *Macrolepiota procera* and *Oudemanciella melanotricha*, and two microfungi strains, namely *Sepedonium* spp. C2812 and C2820, were examined regarding biomass production in submerged fermentations, using glucose and lactose as the carbon sources. Prior to submerged fermentations, the growth rate of mycelium (mm/day) was determined by measuring the colony diameter on the surface of potato dextrose agar plates. The highest growth rate, 6.7 mm/d, was observed for *Sepedonium* sp. C2820, followed by *Phellinus* sp. (5.9 mm/d), *Sepedonium* sp. C2812 (3.7 mm/d) and *Oudemanciella melanotricha* (0.88 mm/d). Kinetics on agar plates demonstrated the ability of these fungal strains to valorize the substrate under solid state fermentations, predetermining also their behavior in submerged fermentations. Static fermentations showed that the highest biomass production, for all fungal strains, was favored in glucose-based substrate and less favored in lactose. It is noteworthy that *Sepedonium* sp. and *Phellinus* sp. achieved a maximum biomass production at the 6th day of fermentation, whereas the respective recordings for *Oudemanciella melanotricha* and *Macrolepiota procera* were observed at the 25th day. The highest biomass production in glucose was achieved by *Sepedonium* sp. C2820 (11,4 g/L), followed by *Oudemanciella melanotricha* (8.3 g/L) and *Sepedonium* sp. C2812 (7.8 g/L). The other two fungal strains produced lower biomass concentrations (up to 3.8 g/L). Results of fermentations using lactose-based medium showed considerably lower biomass concentrations, which ranged from 3.1 to 3.5 g/L for all fungal strains. High performance liquid chromatography demonstrated that all fungal strains were able to assimilate lactose, but in a slower rate than glucose. The recovered biomass from *Sepedonium* sp. and *Phellinus* sp. were subjected to aqueous extraction to receive the water-soluble polysaccharides and evaluate their potential antioxidant properties. Results of antioxidant capacity showed that DPPH free radical was inhibited 24.5% and 32.5% by 20 mg/ml of *Sepedonium* C2812 and *Phellinus* sp. aqueous extract, respectively. The results are encouraging for the bioconversion of glucose and lactose based industrial wastes to fungal biomass with bioactive value.

Acknowledgements

We acknowledge support of this work by the project “Monumental forests of the Ionian Islands as resource areas of biodiversity and high added-value mushrooms: mapping, recording, evaluation, networking, preservation and sustainable exploitation” (MIS 5033680) which is implemented under the Action “Protection of the environment and sustainable development” funded by the Operational Programme “Ionian Islands 2014-2020” and co-financed by Greece and the European Union (European Regional Development Fund).