



Microbial oils enriched with carotenoids for cosmetic and nutraceutical applications

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Abstract:

Microbial oils (MO) of fungal origin, rich in unsaturated fatty acids, have important opportunities in the food, pharmaceutical and cosmetic industries. However, due to the high production costs of MO, to date, only two fungal strains (*Mucor circinelloides* and *Mortierella alpina*) have been successfully used on an industrial scale, in the food sector, for the production of MO rich in omega-3 and -6. In this frame, our study wanted to develop a sustainable process both from an economic and environmental point of view for the production of MO from specific species of oleaginous yeasts having the ability to accumulate large amounts of intracellular lipids and to produce, at the same time, additional interesting compounds such as carotenoids with antioxidant activity. To this aim, different species of red yeasts belonging to *Rhodotorula* and *Rhodospiridium* genera were screened on low-cost substrates (e.g, orange peels, ricotta cheese whey) in order to select the highest lipid producers, with a lipid content with respect to dry biomass over 40 % (w/w). The study, first conducted in shaken flask, allowed to select one strain which was subsequently transferred to bioreactor scale with mechanical agitation in order to evaluate the response of the microorganism and the process scale-up. At the end of the fermentative process, a qualitative and quantitative gas chromatography analysis of the fatty acids produced was performed and total carotenoids were quantified in order to assess the suitability of these oils for nutraceutical and cosmetic applications.

Biography:

Eleonora Carota has completed her PhD course in Science, Technology and Biotechnology for Sustainability



at the University of Tuscia (Viterbo) in 2017 with a thesis concerning microbial oil production from yeasts and molds. She is actually a postdoc researcher at the “Environmental and Applied Microbiology” laboratory (University of Tuscia), headed by Prof. Maurizio Petruccioli. Her main lines of research concern the production of microbial compounds of industrial interest and the bioremediation of waters and soils contaminated by heavy metals by means of microorganisms.

Publication of speakers:

1. Carota, Eleonora & Petruccioli, Maurizio & D’Annibale, Alessandro & Crognale, Silvia. (2020). Mixed glycerol and orange peel-based substrate for fed-batch microbial biodiesel production. *Heliyon*. 6. e04801. 10.1016/j.heliyon.2020.e04801.
2. Carota, Eleonora & Petruccioli, Maurizio & D’Annibale, Alessandro & Gallo, Anna & Crognale, Silvia. (2020). Orange peel waste-based liquid medium for biodiesel production by oleaginous yeasts. *Applied Microbiology and Biotechnology*. 104. 10.1007/s00253-020-10579-y.
3. Vaidya, Vinita & Carota, Eleonora & Calonzi, Dario & Petruccioli, Maurizio & D’Annibale, Alessandro. (2019). Production of lignin-modifying enzymes by *Trametes ochracea* on high-molecular weight fraction of olive mill wastewater, a byproduct of olive oil biorefinery. *New Biotechnology*. 50. 10.1016/j.nbt.2019.01.007.
4. Carota, Eleonora & Petruccioli, Maurizio & Gallo, Anna & Crognale, Silvia & D’Annibale, Alessandro. (2017). Bio-conversion of citrus wastes into lipids by *Zygomycetes*.

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