

Functional hydrolysates obtained through fermentation of flathead grey mullet by-products using *Yarrowia lipolytica* and *Bacillus* sp.

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Citation

Solidea, A., Davide, G., Marianna, C., Samantha, R., Giacomo, B., Lorenzo, S., Rosalba, L., Francesca, P. Functional hydrolysates obtained through fermentation of flathead grey mullet by-products using *Yarrowia lipolytica* and *Bacillus* sp.

Recently fish processing industry has experienced significant expansion and this had an impact on the production of fish waste and by-products. Valorization of these marine materials through biotechnological processes can represent a strategy for a sustainable bioeconomy. The aim of this study, performed within the European Project “NewTechAqua”, was to use tailored microbial fermentation as a safe and sustainable technology to obtain a wide variety of added-value compounds. Based on a preliminary screening that allowed to define the best proteolytic and lipolytic microorganisms, two strains of *Bacillus* sp. (B5M and B5C) and two strains of *Yarrowia lipolytica* (YL2 and YL4) were incubated up to 9 days with flathead grey mullet (*Mugil cephalus*) by-products. The growth of microbial strains was followed over time by plate counting *Y. lipolytica* in YPD agar and *Bacillus* sp. in BHI agar.

Liquid samples were analyzed after 4 and 9 days of incubation to evaluate the peptide content (OPA assay) and antioxidant activity (DPPH and ABTS assay). The production of volatile compounds was evaluated by SPME/GC-MS technique. Samples collected at 9 days were also lyophilized and characterized in the same way as liquid samples. All the microorganisms were able to develop in the substrate. The peptide content in liquid samples reached the highest concentration (102 mg/mL) after 9 days of incubation, especially with Bacilli. Strains B5M and YL2 showed also the highest antioxidant activity (around 53-60 %). Yeasts produced mainly alcohols and aldehydes, while samples containing Bacilli were characterized by ketones and alcohols. A longer incubation determined a lower abundance of volatile compounds. Regarding the freeze-dried hydrolysates, those obtained with yeasts showed a better antioxidant activity and a higher acids content. Overall, microbial fermentation of fish by-products represents a promising tool to produce functional and flavoring compounds that can be used as ingredients in the food sector.