Research line: Marine bioactive compounds for applications in food industry



Research group: Catholic University of Portugal - Centre for Biotechnology and Fine Chemistry (CBQF)

Objectives

This research line intends to pursue the exploitation of several marine resources, in particular microalgae, as well as an efficient valorisation of residues resulting therefrom, targeted for implementation in food industry.

Description

At the marine level, the excessive exploitation of its natural resources has been considerable, both at environmental and socioeconomic levels, due to the high production of residues resulting from transforming activities in food and aquaculture sectors. Their reutilization or economic valorisation would be not only desirable but also profitable, both from economic and environmental points of view. Furthermore, among the existing resources along the marine coast are a huge number of organisms, which include macroalgae, microalgae and cyanobacteria, capable of synthesizing, accumulating and excreting a large variety of metabolites with increased commercial potential.

Techniques

It is intended to identify and characterize new sources of functional ingredients (polyunsaturated and conjugated free fatty acids, proteins, biopeptides, and antimicrobial compounds, among others) to incorporate in food matrices, as well as new applications for these ingredients. The sources explored will include flora and fauna from marine and river environments, as well as residues from transforming industries. Several microalgae extracts will be obtained and tested for their biocide (anti-biofilm) potential in collaboration with the team from FEUP (Portugal). A higher production rate of polyunsaturated acids and other bioactive lipids will be sought under the application of a different set of stress conditions on microalgae cultures in autotrophic growth. Lipids will be analysed using GC-FID analytical methodology. Microalgae per si will be incorporated in different food matrices for development of functional food rich in carotenoids and polyunsaturated fatty acids and their stability and sensorial quality assessed. To further improve bioactivity/nutrient bioavailability, microalgae will be submitted to different combinations of hydrolysis conditions (enzyme:substrate ratios, temperature, time) and the hydrolysates will be characterised in terms of antimicrobial (disk-diffusion method against several foodborne and clinical pathogens), antioxidant (radical scavenging assays) and anti-hypertensive (spectrophotometric method) potential. Fish gelatins obtained from different fish residues by the team from CSIC (Spain) will be characterized for their dynamic viscoelastic properties, gelling and melting temperatures and gel strength by differential scanning calorimetry and rheological techniques. Their incorporation in novel design-foods with beneficial health properties will be sought.

- 1. Mendes et al. (2013) International Food Research Journal 20 Issue 6 2913
- 2. Carvalho et al. (2005) J. Agric. Food Chem. 53: 5049-5059.
- 3. Madureira et al. (2011) LWT Food Science and Technology 44 (1), 75-41.



