

EFFICIENT RECOVERY OF BIOACTIVE COMPOUNDS FROM MACRO ALGAE APPLYING ECOFRIENDLY EXTRACTION PROCESS

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ABSTRACT

Macroalgae, are photosynthetic autotrophic organisms, containing a variety of bioactive compounds, such as lipids, proteins, polysaccharides, and phenolic compounds, and have been applied in food, cosmetic and fuel industries. Especially, macroalgae extracts have gained interest due to their biological profile and health-promoting benefits, including antimicrobial, antioxidant, antiallergic, antiproliferative and neuroprotective properties as well as their activity against metabolic syndrome (obesity, diabetes, hypertension, and dyslipidemia). Due to the high concentration of docosahexaenoic (DHA) and eicosapentaenoic acids (EPA), macroalgae lipids present crucial physiological functions, such as antibacterial, anti-inflammatory, and immune regulation. A variety of extraction procedures of various bioactives from microalgae have been applied, including classical and innovative approaches such as ultrasound or/and microwave assisted extraction and Pressure Liquid Extraction (PLE) [1,2].

In the current work, the efficiently extraction of lipids and carotenoids as well as the determination of protein content, from the green *Ulva lactuca* and the red macro algae, *Chondracanthus sp.*, using ecofriendly extraction is illustrated. The recovery of the lipids was carried out using ultrasound assisted extraction applying: i) the Bligh-Dyer procedure (chloroform/methanol/water extraction media), ii) the Folch procedure (chloroform/methanol (2:1 v/v)) and iii) an ecofriendly extraction procedure using water, ethanol and/or ethyl acetate as an extraction media for the potential substitution of methanol and chloroform. The optimization of the extraction regarding the extraction yield was achieved studying different parameters such as the combination and the ratio of the selected solvents, solid:liquid ratio, extraction time and power. After the compliance of the extraction the phases were separated and the caretonoids were determined using High-Pressure-Liquid Chromatography (HPLC) while the fatty acid composition of the lipid phase was determined as the methyl esters of fatty acids by gas-liquid chromatography (GC). Moreover, the protein content of the aqueous extract, as well as of the untreated algae was calculated by Kjendhal method.

The results revealed that for both *Ulva lactuca* and *Chondracanthus sp.*, the lipid extraction yield was higher using Folch procedure than Bligh-Dyer while the ecofriendly system is shown to be as effective as the conventional Folch procedure. The protein content of the tested algae was calculated approximately to 20%. *Ulva lactuca* and *Chondracanthus sp.* macroalgae was considered a good source of marine lipids render them potential supplement in various food and cosmetic products.

KEYWORDS: macro algae, extraction, lipids

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