



“Gheorghe Asachi” Technical University of Iasi, Romania



PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF EXTRACTS FROM *Bifurcaria bifurcata* ALGA, OBTAINED BY DIVERSE EXTRACTION CONDITIONS USING THREE DIFFERENT TECHNIQUES (HYDROTHERMAL, ULTRASOUNDS AND SUPERCRITICAL CO₂)

Rubén Agregán¹, Paulo E.S. Munekata², Daniel Franco¹, Rubén Domínguez¹, Javier Carballo³, Voster Muchenje⁴, Francisco J. Barba⁵, José M. Lorenzo^{1*}

¹Centro Tecnológico de la Carne de Galicia, Adva. Galicia n 4, Parque Tecnológico de Galicia, San Cibrao das Viñas, 32900 Ourense, Spain

²Department of Food Engineering, Faculty of Animal Science and Food Engineering, University of São Paulo, 225 Duque de Caxias Norte Ave, Jardim Elite, postal code 13.635-900, Pirassununga, São Paulo, Brazil

³Area de Tecnología de los Alimentos, Facultad de Ciencias de Ourense, Universidad de Vigo, 32004 Ourense, Spain.

⁴Department of Livestock and Pasture Science, University of Fort Hare, Private Bag X 1314, Alice, South Africa

⁵Nutrition and Food Science Area, Preventive Medicine and Public Health, Food Science, Toxicology and Forensic Medicine Department, Universitat de València, Avda. Vicent Andrés Estellés, s/n, Burjassot, 46100 València, Spain

Abstract

Extracts of *Bifurcaria bifurcata* seaweed were obtained by diverse conditions. Different extraction techniques, such as hydrothermal and ultrasounds, and three different solvents (water, ethanol and water/ethanol (50:50)) depending on technique were used. Moreover, supercritical CO₂ (SC-CO₂) with 10% of ethanol as co-solvent using different extraction times (30, 45 and 60 min) was also used as extraction technique. Extraction yield, phenolic content and antioxidant activity were measured for each extract. Hydrothermal extraction obtained better extraction yields than ultrasound extraction. Regarding the effect of solvent composition, water/ethanol (50:50) in hydrothermal treatment (HW50E50) and water/ethanol (50:50) in ultrasound treatment (UW50E50) showed the highest extraction yields. The worst extraction yields were shown by the extraction with SC-CO₂. Water/ethanol (50:50) showed to be more efficient extracting phenolic compounds than water, although the highest extraction was achieved by ethanol. On the other hand, ultrasound-assisted extraction seemed to be more efficient extracting phenolic compounds than hydrothermal extraction. From the results obtained, it can be concluded that the use of ultrasound extraction technique and the use of water/ethanol as extracting solvent seemed to be the best extraction condition.

Keywords: *Bifurcaria bifurcata*, hydrothermal, supercritical CO₂, ultrasound

Received: January, 2018; Revised final: April, 2018; Accepted: July, 2018; Published in final edited form: July, 2019

* Author to whom all correspondence should be addressed: e-mail: jmlorenzo@ceteca.net; Phone: +34 988548277; Fax: +34 988548276