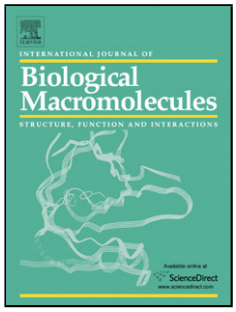

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Authors: Sabrine Sellimi, Abdelkarim Benslima, Veronique Barragan Montero, Mohamed Hajji, Moncef Nasri

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Polyphenolic-protein-polysaccharide ternary conjugates from *Cystoseira barbata* Tunisian seaweed as potential biopreservatives: chemical, antioxidant and antimicrobial properties

Sabrine Sellimi*[1], Abdelkarim Benslima[1], Veronique Barragan Montero[2], Mohamed Hajji[1] and Moncef Nasri[1]

[1] Laboratoire de Génie Enzymatique et de Microbiologie, Ecole Nationale d'Ingénieurs de Sfax, Université de Sfax, BP 1171 Sfax 3000.

[2] Université de Montpellier II.

* Corresponding author.

E-mail address: ssellimi@gmail.com.

Tel. : +216 20 096 945

Abstract

The present study investigated the antioxidant and antimicrobial activities of naturally occurring glyco-conjugates from *Cystoseira barbata* seaweed (CBGs), with a view to developing safer food preservatives. CBGs were successfully isolated, then chemically and structurally characterized. CBGs contained a high amount of polysaccharides (49.76%) that consisted mainly of neutral sugars (47.67%) and uronic acids (2.09%). The carbohydrate fraction was sulfated (13.81%) and conjugated with proteins (9.86%) and phenolic compounds (4.98%). Infrared spectroscopy of CBGs showed interactions between polyphenols, proteins and polysaccharides, which were characterized by α-type glycosidic bond and sulfate groups in the axial position of sugar residues. Neutral sugars analysis of CBGs by GC-MS revealed that conjugated polysaccharides were mainly composed of galactose (34.02%), fucose (26.25%) and mannitol (21.25%) with few amounts of other sugars such as glucose (5.78%), rhamnose (4.9%), xylose (3.22%) and mannose (2.22%). Analysis of the amino acid composition of CBGs showed a high level of essential amino acids (40.36%), in which threonine was the most relevant (10.28%). LC-QTOF-MS analysis of the phenolic fraction of CBGs showed a variety of phenolic compounds including flavonoids, phlorotannins and anthraquinone glycosides. CBGs exhibited potent antioxidant activities including radical scavenging activity, chelating ability and reducing power, and displayed noticeable antibacterial and antifungal activities, which may open the way to the development of a natural biopreservation strategy based on algae.

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Keywords : Glyco-conjugates; ATR-FTIR analysis; Monosaccharide composition; Amino acid; Phenolic compound; Antioxidant and antimicrobial

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1. Introduction