



## Fucans from a Tunisian brown seaweed *Cystoseira barbata*: Structural characteristics and antioxidant activity



Sabrina Sellimi<sup>a,\*</sup>, Nabil Kadri<sup>b</sup>, Veronique Barragan-Montero<sup>b</sup>, Hocine Laouer<sup>c</sup>,  
Mohamed Hajji<sup>a</sup>, Moncef Nasri<sup>a</sup>

<sup>a</sup> Laboratoire de Génie Enzymatique et de Microbiologie, Université de Sfax, Ecole Nationale d'Ingénieurs de Sfax, B.P. 1173, 3038 Sfax, Tunisia

<sup>b</sup> Laboratoire de Glycochimie et Reconnaissance Moléculaire, UMR 5032, Université Montpellier II, ENSCM, 8, rue de l'Ecole-Normale, 34296 Montpellier Cedex, France

<sup>c</sup> Laboratoire de Valorisation des Ressources Biologiques Naturelles, Faculté des Sciences Naturelles et de la Vie UFA, Sétif, Algeria

### article info

#### Article history:

Received 12 December 2013

Received in revised form 18 February 2014

Accepted 19 February 2014

Available online 28 February 2014

#### Keywords:

*Cystoseira barbata*

Fucans

GC–MS

<sup>1</sup>H-NMR

ATR-FTIR

Antioxidant activity

### abstract

Sulfated polysaccharides from brown seaweeds are known to be a topic of numerous studies, due to their beneficial biological properties including antioxidant activity. Fucans were isolated from the brown seaweed *Cystoseira barbata* harvested in Tunisia. ATR-FTIR and <sup>1</sup>H-NMR spectroscopies demonstrated that *C. barbata* sulfated polysaccharides (CBSP<sub>s</sub>) consisted mainly of 3-linked-**a**-l-fucopyranosyl backbone, acetylated and mostly sulfated at C-4. Molar degrees of sulfation and acetylation of CBSP<sub>s</sub> were 0.79 and 0.27, respectively. Neutral sugars analysis determined by gas chromatography–mass spectrometry (GC–MS) showed that CBSP<sub>s</sub> were mainly composed of fucose (44.6%) and galactose (34.32%) with few amounts of other sugars such as glucose (7.55%), rhamnose (6.41%), xylose (4.21%) and mannose (2.91%). CBSP<sub>s</sub> were examined for *in vitro* antioxidant properties using various antioxidant assays. CBSP<sub>s</sub> exhibited important DPPH radical-scavenging activity (100% inhibition at a concentration of 1.5 mg/ml) and considerable ferric reducing potential (24.62 mg ascorbic acid equivalents). Effective chelating activity and significant protection activity against hydroxyl radical induced DNA breakage were also recorded for CBSP<sub>s</sub>. However, in the linoleate-**b**-carotene system, CBSP<sub>s</sub> exerted moderate antioxidant activity (62% inhibition at a concentration of 1.5 mg/ml). Therefore, CBSP<sub>s</sub> can be used as a potent natural antioxidant in food industry or in the pharmaceutical field.