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Fatty Acid Profile and Isolation of Bioactive Compounds from the Acetone Extract of *Cystoseira stricta* L., Harvested from Western Algeria

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THE MAIN objective of this work is to study the fatty acid profiles and isolate the bioactive compounds using thin layer chromatography (TLC) and column chromatography (CC) Biological evaluation of the potential nutritional of the extracts of brown alga *Cystoseira stricta* L., collected on the coast of Khadra, in the Wilaya of Mostaganem (Algeria) was carried out.

Cystoseira stricta L., give 19.8% of the lipids in the winter season with an important fatty acid profile. A study of the isolation of bioactive terpenoids with the valuation of the biological activity of the acetone extract of *Cystosirea strictra* L. It was defined with the greatest probability of exerting an antifungal activity against *Candida albucans ATCC 10231*. The phytochemical isolation led to the isolation of a pure compound 271.24 [M + H] m /z with less exhibiting. Structural elucidation was done on the basis of the NMR data (^{1}H and ^{13}C NMR) in comparison with reported literature. *Cystoseira stricta* L. from is a good source of compounds against fungal strain such as *Candida albucans ATCC 10231.*

Keywords: Algeria, Bioactive compounds, *Candida albucans* L., *Cystoseira stricta* L., Fatty acid.

Introduction

Algae constitute an important heritage for humanity and play a role in marine environmental communities (Birkett et al., 1998). Marine algae are simply plant substance that lives at the seaside. Algae are simple marine plants that grow in shallow waters, deep in the ocean. The term alga includes macroscopic, multicellular benthic marine algae, consisting of members of brown, red and green algae (Mchugh et al., 2003).

They photosynthesize like land plants but differ morphologically and structurally. They are like a leaf (thalli) in which photosynthesis takes place, but unlike land plants, they lack an internal transport system consisting of xylem and phloem vessels. Their thalli are soaked in seawater and that allows materials to enter and exit their tissues by diffusion. They have a low lipid content, but a high concentration of polysaccharides, natural rich in minerals, polyunsaturated fatty acids, and vitamins, as well as bioactive molecules, which make them a good source of pharmaceutical agents (Ruperez, 2002). The *Cystoseira stricta* L. is a large photophyle, consisting of one or more trunks carrying many ramifications; it colonizes the beaten and enlightened rocks of the infrallitoral floor of the Mediterranean (Cabane et al., 2012).

The chemical composition of seaweed depends on the species, the place of culture, the atmospheric conditions and the period of collection. From a nutritional point of view,seaweed is of great interest due to its high content of dietary fiber (33-50% dry weight), as it is an important source of protein (5-24% of brown algae, 10-47% green algae) (Mohamed et al, 2013) and minerals (8 to 40%), and due to their low lipid content (1-2%) (Ruperez, 2002).

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Macroalgae is capable of producing secondary metabolites such as diterpenes, non-volatile halogenated compounds, with different carbon structures such as dolabellans, hydroazulenoides, xenicanes and sesquiterpenoides (Gupta & Abu-Ghannam, 2011). *Dictyodial, Dictyol* C and *Dictyol H* are diterpenes isolated from the brown algae *Dictyota ciliolate* (Manzo et al., 2009). They have cytotoxicity, antiviral, antifungal and algicidal activities. Diterpenes extracted from *Dictyota pfaffii* and *Dictyota menstrualis* inhibit herpes simplex virus type 1 infection (Abrantes et al., 2010). The algal lipids are particular sources of sterols, which are an interesting characteristic of some brown algae *(Fucosterol*). Their contribution as a source of food energy seems low. On the other hand, phytosterols exhibit anti-fungal, antibacterial, anti-inflammatory, anti-tumor, antioxidant and anti-cholesterol activities (Sánchez-Machado et al., 2004).

Marine macroalgae have a low lipid content (1 to 5% of their dry weight), but their composition in polyunsaturated fatty acids is very interesting, namely the n-3 and n-6 series (Burtin, 2003). The lipid content is very low and varies from 1-5% (Person, 2010). Phospholipids and glycolipids are the main classes of lipids, and algae accumulate PUFAs when there is a drop in environmental temperature (Holdt & Kraan, 2011). which exhibit a wide variety of biological activities including antibacterial, anti-inflammatory, antifungal, antitumorals, antiviral, and antioxidant (Patra et al., 2008).

Materials and Methods

Extraction of total lipids

The determination of total lipids according to the method described by Bligh & Dyer (1959). To 5g of seaweed, previously dried, 10mL of methanol and 5mL of chloroform were added. It was homogenized, with agitation, for 5min, in a gobelé covered with aluminum foil, in order to reduce the exchange of gases with the environment. 5mL of chloroform, 5mg of BHT and 5mL of distilled water were added and homogenized for 5min. The ultrasound bath (BANDELIN SONOREX RK 52H) was taken for 15min at 30ºC. The preparation was centrifuged at 3500rpm for 5min, in a centrifuge (HERMLE Z323), the supernatant was collected in a separating funnel. To the precipitate, 5mL of chloroform and 5mL of methanol were added and it was again centrifuged under the previous conditions. The resulting precipitate was washed again, according to the previous instructions. To the final supernatant obtained, 10mL of water were added, in order to maintain the proportion of water, the filtrate was left in a separating funnel until phase separation (12-14h). The organic phase, which contains the fraction of isolated lipids, was decanted in a tared pear-shaped flask and evaporated on a rotary evaporator at 60°C, to constant weight. The atmosphere was saturated with nitrogen, covered with parafilm and stored in the refrigerator. The time elapsed between the extraction and the determination of the fatty acid profile never exceeded 48h.

The fatty acid content

The samples were determined by saponification, hydrolysis and methylation and the separation of the methyl esters was carried out by gas chromatography (GC),

Determination equipment characteristics and analytical conditions

A Varian model CP-3800 gas chromatograph (connected to Galaxie Chromatography Workstation software version 1.9.3.2) was used, equipped with a silica capillary column (0.25mmx 100m) covered with a CP. Sil 88 film. with a thickness of 0.20µm and a flame ionization detector.

Seaweed extracts

For the preparation of the seaweed extracts, 10g of the sample was added to 150mL of organic solvent. The resulting mixture is then macerated continuously in the dark for 24h, three times at room temperature. The extraction was carried out separately with different organic solvents: acetone. After filtration on Wattman No. 1 paper, the organic extract was concentrated by evaporation under reduced pressure using a rotary evaporator at 40°C.

Thin layer chromatography (TLC)

Thin layer chromatography was carried out on precoated 60 F254 silica gel plates (Merck) with a layer thickness 0.2mm of the compounds which was carried out by spraying with the addition of 2.5mL sulfuric acid. TLC plates were heated on a hot plate until the spots became visible.

Column chromatography (CC).

With the growth of polarity until you find the greatest mixture of solvents. About 100mg of crude extract was loaded onto a 1g silica gel column and eluted with solvents of increasing polarity. A total

of nine fractions were obtained for the algae.

Biological activity test

Antimicrobial dosage

Preparation of samples for antimicrobial assays by well diffusion method on Mueller-Hinton agar and Sabouraud agar consecutively. Petri dishes containing the two media were inoculated aseptically with 100µL of microbial suspension, the turbidity of which was adjusted to 108CFU/ mL for bacteria, 106CFU/mL for yeasts. and 106 spores/ mL for fungi .As the last test performed. In wells 4.5mm in diameter, we introduced 50µL of crude extract. In order to allow radial diffusion of the inhibitory agent, the Petri dishes thus prepared were preincubated for 2 to 4h at 4°C, then incubated at 37°C for 24h for the bacteria, and at 25°C for 48h for yeasts and 7 days for mushrooms. The antimicrobial activity of the crude extract was determined by measuring the diameter of the zone of inhibition formed around each well.

Pathogens used for the test

The strains used for the antibacterial and antifungal tests were obtained from the Institut Pasteur in Algeria, are clinical isolates of fungal strains (*Candida albicans* ATCC 10231 and *Aspergillus niger* ATCC 106404), gram-positive bacterial strains (*Bacillus cereus* ATCC 10876, *Bacillus subtilis* ATCC 6633 and *Staphylococcus aureus* ATCC 33862) and gram-negative bacterial strains (*Pseudomonas aeruginosa* ATCC 27853, *Escherichia coli* ATCC 25922 and *Schigella* sp.)

Analysis of the fractions of the extract of Cystoseira stricta L., HPLC-PDA profile and full ion chromatogram mode profile by LC-MS

Chromatographic profiles of extracts of different species obtained by the diode array alarm coupled with high performance liquid chromatography. (HPLC-PDA) and UFLC-ESI-TOF. First, the extracts were analyzed in a Shimadzu © high performance liquid chromatograph (HPLC) composed of two LC6-AD pumps, automatic injection system SIL-10AF coupled to a detector with a PDA photodiode array), at the ‘using a Phenomenex Luna C-18 reverse phase column (4.6 x 250mm, 5µM),

Results

The lipid content

The total lipid contents were found to be 1.2% of the dry weight in winter. According to Taboada et al. (2010), *Ulva rigida* has 0.9% of lipids and according to Marsham et al. (2007), *Osmonde spinabifida* presented a lipid content of 4.3±6.38. According to the same author, the species *Fucus serratus* exhibited 1.8±0.3% lipids. Marine macroalgae have a low lipid content (1-5% of their dry weight), however, they have a very interesting polyunsaturated fatty acid composition, mainly those of the n-3 and n-6 series (Burtin, 2003) (Table 1).

TABLE 1. Evaluation of fatty acids in *Cystoseira stricta* L.

Undecanóico (C11:0)	0,10 ± 0,03
Láurico (C12:0) Dodecanóico	0,11 ± 0,02
Mirístico (C14:0) Tetradecanóico	5,47 ± 0,51
Mirísticoleico (C14:1) cis-5 Tetradecanóico	-
Pentadecanóico (C15:0)	0,32 ± 0,03
Pentadecanóico (C15:1) cis-10 Pentadecanoico	-
Palmítico (C16:0) Hexadecanóico	31,27 ± 2,15
Palmiticoleico (C16:1) cis-7 Hexadecanóico	1,59 ± 0,11
Heptadecanóico (C17:0)	0,14 ± 0,01
Heptadecenóico (C17:1) cis-10 Heptadecenoico	0,11 ± 0,00
Esteárico (C18:0) Octadecanóico	0,68 ± 0,09
Oleico (C18:1 n-9) cis-9 Octadecenóico	14,77 ± 0,10
Linoleico (C18:2 n-6t) trans-9, 12 Octadecadienóico	-
Linoleico (C18:2 n-6c) cis-9, 12 Octadecadienóico	5,62 ± 0,06
γ Linolénico (C18:3 n-6) cis-6, 9, 12-Octadecatrienóico	0,36 ± 0,01
Eicosenóico (C20:1) cis-11 Eicosenóico	7,67 ± 0,08
α Linolénico (C18:3 n-3) cis-9, 12,15 Octadecatrienóico	-
Heneicosanóico (C21:0) Heneicosanóico	6,00 ± 0,20
Eicosadienóico (C20:2) cis 11,14 Eicosadienóico	0,40 ± 0,03
Beénico (C22:0) Docosanóico	1,14 ± 0,13
Eicosatrienóico (C20:3 n-6) cis-8,11,14 Eicosatrienóico	-

TABLE 1. Cont.

Erucíco (C22:1 n-9) Docosenóico	0,16 ± 0,01
Eicosatrenóico (C20:3 n-3) cis-11,14,17 Eicosatrienóico	20,02 ± 1,80
Tricosanóico (C23:0)	-
Lignocérico (C24:0) Tetraco-sanóico	4,06 ± 0,41
EPA (C20:5 n-3) cis-5, 8, 11, 14, 17 Eicosapentaenóico	-
Grupo de Ácido Gordo	
ΣSFA Saturated fatty acids	49,29 ± 1,86
Σ MUFA Monounsaturated fatty acids	24,31 ± 0,05
Σ PUFA Polyunsaturated fatty acid	26,40 ± 1,81
Σ TFA Fatty acids of trans con-figuration	0,00 ± 0,00
Σ n-3 em tFAME	20,02 ± 1,80
Σ n-6 em tFAME	6,38 ± 0,01
Σ n-9 em tFAME	14,93 ± 0,09
Σ ω-6/ω-3	0,32 ± 0,03
Σ h/H	1,12 ± 0,13

Macroalgae have lipid profiles which can vary both geographically and seasonally (Johns et al., 1979; Nelson et al., 2002b). It would be necessary to collect this species, at the same place and time of the year, in order to assess the seasonal variation in the fat content obtained.

There is a long tradition of consuming seaweed in the Far East and the Pacific, while in Western countries, the main use of seaweed is as a source of phycocolloids (alginates, carrageenates and agar), thickeners and gelling agents for various purposes industries, including use in food manufacturing (Burtin, 2003). The nutritional value of marine macroalgae varies by species (Hwang et al., 2007), and the fatty acid content can vary due to environmental and genetic factors (Nelson et al., 2002b).

Saturated fatty acids, palmitic (C16: 0) and myristic (C14: 0) and monounsaturated, oleic (C18: 1 n-9) are the most abundant in the algae studied. This result is consistent with the existing literature consulted for both the genera and the species studied [Genus *Cystoseira* (Khotimchenko et al., 2002), genus *Fucus* (Fleurence et al., 1994; Khotimchenko et al., 2002; Kim et al., 1996), genus *Chaetomorpha* (Khotimchenko, 1993; Khotimchenko et al., 2002), genus *Codium* (Khotimchenko, 1993; Xu et al., 1998), genus *Porphyra* (*P. amplissima* and *P. umbilicalis*- Blouin et al., 2006; *Porphyra* sp. - Sánchez-Machado et al., 2004; Dawczynski et al., 2007; *P. umbilicalis* - Fleurence et al., 1994)].

Cystoseira stricta L., is reported for the first time in the present work from the Algerian dimension that saturated fatty acids are palmitic acid (C16: 0) a 31.27% ± 2.15. Result which is not in agreement with those obtained by the authors cited above (where palmitic is the most abundant saturated fatty acid).

Polyun saturated fatty acids (PUFAs), obtained in the diet, have an effect on several processes impacting on health and chronic diseases such as the regulation of lipid levels in plasma, immune and cardiovascular function, development neuronal and visual function. Ingested PUFAs are distributed, virtually, to all cells in the human body, affecting membrane composition and function, eukosanoid synthesis, cell signaling, and regulation of gene expression (Benatti et al., 2004). The human body lacks the capacity to produce α-ALA and LA fatty acids, which is why they are considered essential. The α-ALA and LA fatty acids, which come from the human diet, are precursors of EPA and DHA and AA, respectively (Su et al., 1999).

In this study, analyzed content of fatty acid, is in agreement with the results obtained by several authors for the genus or for the species of alga in question [Genus *Cystoseira* (Khotimchenko, et al., 2002), genus *Fucus* (Fleurence et al., 1994; Khotimchenko et al., 2002; Kim et al., 1996), genus *Chaetomorpha* - Khotimchenko, 1993; Khotimchenko, et al., 2002; genus *Codium* - Khotimchenko, 1993, Xu et al., 1998; *Porphyra*- Blouin et al., 2006, Sánchez-Machado et al., 2004, Dawczynski et al., 2007, Fleurence, et al., 1994)]. With the exception of the species *Cystoseira stricta* sp. for which there are no published results on the content of α-ALA fatty acids have been identified in *Cystoseira stricta* sp. Other authors have obtained similar results for the genus *Porphyra* (*P. amplissima* and *P. umbilicalis*- Blouin et al., 2006; *Porphyra* sp. - Sánchez-Machado et al., 2004 and Dawczynski et al., 2007; *P. umbilicalis* - Fleurence et al., 1994), with values (in percentage) between 0.23 ± 0.16 and 5.66 ± 4.74 and for the genus *Chaetomorpha* (Khotimchenko et al., 2002), with a value of 1,

9% of the total FAME , respectively. However, according to the authors cited above, the fact that these two fatty acids have not been identified in all species of algae may be linked to a number of factors: environmental, geographic and genetic. According to Dawes (1998) algae exhibit a large variation in nutrient content, which is related to several environmental factors such as water temperature, salinity, light and nutrients available. The composition of lipids and fatty acids may also vary over time (Honya et al., 1994; Nelson et al., 2002a; Ivesa et al., 2004; Kostetsky et al., 2004; Khotimchenko, 2006, Renaud & Luong -Van, 2006). In this large class of brown macroalgae, the lipid composition exhibits a certain seasonality. Lipid levels are higher in winter and spring and lower in summer (Johns et al., 1979; Nelson et al., 2002b). According to Kim et al. (1996), the proportion of fatty acids in the *Cystoseira stricta* L. may depend on temperature, light, nitrogen levels and variation in seawater salinity.

Chromatographic analyzes of acetone extracts of the brown alga Cystoseira stricta L:

It was carried out primarily for the purpose of obtaining a profile of the extracts. The determination of this parameter allows us to assess the complexity of the extracts, to assess their stability if necessary and also serves as a basis for subsequent procedures of fractionation of extracts and isolation of compounds by preparative chromatographic methodologies. Initially, raw extracts were evaluated by chromatography, the biological activities of which were evaluated while the acetone extract of *Cystosirea stricta* L., sp was only integrated in the work during bio-guided fractionation studies and will therefore be discussed again with reference to the chromatographic profiles of the extract The algae species were obtained by two different methodologies, by HPLC-PDA and UFLC-ESI-TOF. First of all, the extracts were analyzed in a Shimadzu © high performance liquid chromatograph (HPLC) composed of two LC6-AD pumps, automatic injection system SIL-10AF coupled to a detector with a PDA photodiode array), at using a Luna C-18 Phenomenon reversed phase column (4.6 x 250 mm, 5µM), by the TIC mode "total ion chromatogram", in which the peaks correspond to the sum of all the ratios m/ z of mass load [M + H] + analyzed in a determined time, linked to the retention time, demonstrated in minutes. In the detector, an array of diodes and signal is generated in a radiation spectrum that covers a wide range of wavelengths. It can be an important tool for the identification of certain chemical classes which have characteristic absorption ranges, such as terpenes which have maximum absorption at wavelengths of around 250nm (Walker & Hawkins, 1952), tannins around 280nm (Gorinstein et al., 1993) and mycosporins and polyphenols around 330nm (Carreto et al., 2011), however the wavelength at maximum absorption is a intrinsic factor of each molecule and varies according to the different configurations they may present (Silverstein et al., 1997) (Fig. 1a, b).

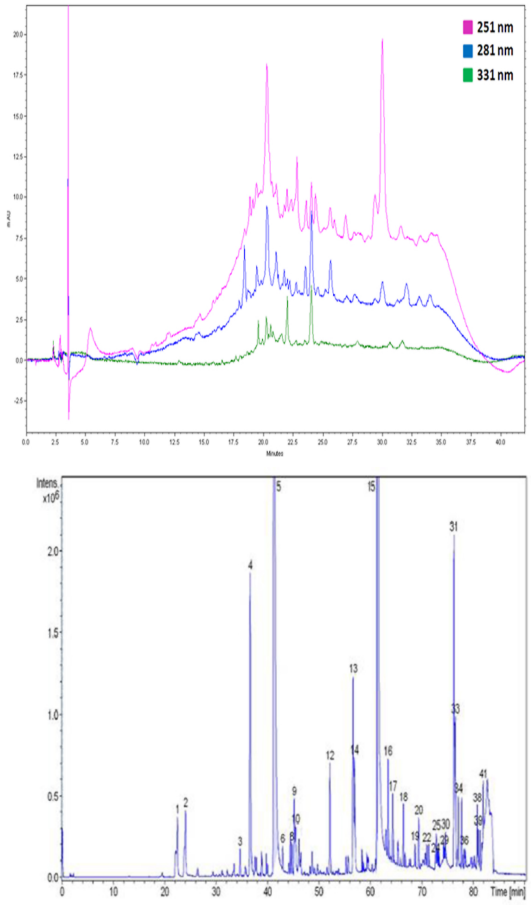


Fig. 1. Chromatograms obtained in the analysis of the extract of *Cystoseira stricta* L., monitored in 3 wavelengths: 331nm (green), 281nm (blue) and 251nm (pink), in HPLC-PDA analysis (upper chromatogram) and full ion chromatogram mode by LC-MS (lower chromatogram)

Thin layer chromatography (TLC)

Separation by column chromatography(CC)

Evaluation of the biological activity of

Cystoseira stricta L. extract fractions: After fractionation of the extract of *Cystoseira stricta* L: by preparatory TLC, the 10 fractions obtained were evaluated for their bilogical activity, which had already been verified in the evaluation of the crude extract. The test was carried out in the same way as described previously. Table 2 shows a significant inhibition zone by fraction No. 08.. Among these fractions, the main highlight was for fraction 07, which reached a very expressive rate of bacterial inhibition of 21mm just after 24h of exposure, representing the only active fraction of the extract (Fig. 2)

TABLE 2. Calculation of the inhibitory activity of the positive fractions

Strain	Fraction 7	Fraction 8
Fungal strains		
Candida albucans ATCC 10231	15mm	21mm
Gram positive bacterial strain		
Staphylococcus aureus ATCC 33862	7mm	7mm
Gram negative bacterial strain		
Escherichia coli ATCC 25922	9mm	8mm

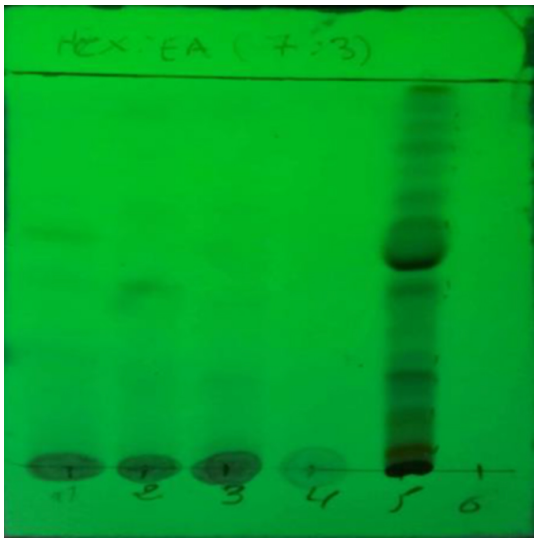


Fig. 2. fractionations of the acetonic extract of *Cystoseira stricta* L. by TLC

Separation by column chromatography(CC)

Separation by column chromatography(CC) is illustrated in Fig.3.

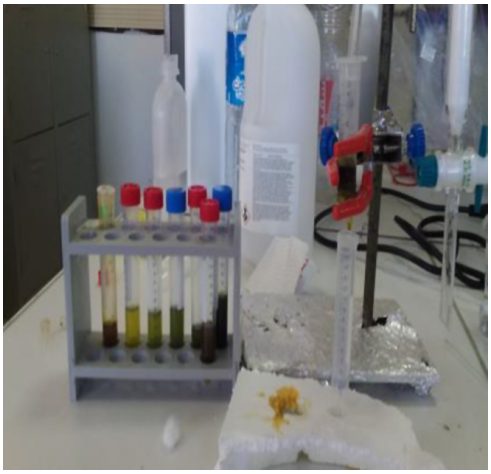
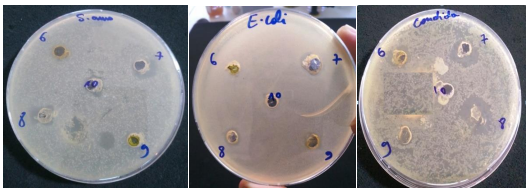


Fig. 3. column chromatography of crude extract of *Cystoseira stricta* L .

Evaluation of the biological activity of Cystoseira stricta L. extract fractions

After fractionation of the extract of *Cystoseira stricta* L. by preparatory TLC, the 10 fractions obtained were evaluated for their bilogical activity, which had already been verified in the evaluation of the crude extract. The test was carried out in the same way as described previously. Table 2 shows a significant inhibition zone by fraction No. 08.. Among these fractions, the main highlight was for fraction 07, which reached a very expressive rate of bacterial inhibition of 21mm just after 24h of exposure, representing the only active fraction of the extract (Fig. 4).



Staphylococcus aureus ATCC 33862 *Escherichia coli* ATCC 25922 *Candida albucans* ATCC

Fig. 4. The biological test the 10 fractions

After fractionation of the extract of *Cystosirea stricta* L. sp. by preparatory CCD chromatography on colon), the 10 fractions obtained were evaluated for their biological activities, which had already been verified in the evaluation of the crude extract. The test was carried out in the same way as described above. Each of the 10 fractions was exposed to a few worms for 24h at a determined concentration. All evaluations were performed using 1.5% DMSO as a negative test control and a positive amphotericin concentration control (Amphotericin B (20mg/ well) 13±1.2) Previously (Tawfiq et al., 2018).

By analyzing the table, it is possible to visualize the total inhibition of the fungal and bacterial strains gram positive and strain negative, at the time of the final evaluation, however these indices were reached at different times for each of the fractions. Among these fractions, the most pronounced activity was related to fraction 08, which promoted inhibition during

It can be seen that fraction 08 exhibited the most relevant result among the fractions, achieving a significant inhibition rate exceeding 21cm on the fungal strains *Candida albucans* ATCC 10231 within the first 24h of exposure. From these data, it can be said that the active substance has an intermediate polarity compared to the rest of the substances present in the crude extract, since the active fractions were collected in the regions of the RF plate close to 0.5. For the other fractions, there was only a slight inhibitory effect in fractions 7 and 6.

Analyzes the fraction 08 profile UFLC-ESI-TOF:

Once the constituent substance of the extracts of algae of the genus *Cystosirea* has been defined with the highest probability of exerting antifungal activity against *Candida albucans* ATCC 10231 the first 24 hours of exposure ,followed by fraction 7 (between 24 and 48h) and on the other hand, the other fraction give only low active fraction of the extract, as shown in Fig. 5, which demonstrated the main activity in the fungal activity evaluation test, 10 peaks were obtained. The major peak obtained (peak 6) had a retention time of 59.9 min and an m/z of 271.24, followed by 3 peaks of intermediate intensity, peak 5 (57.9min; m/ z 287, 23), and peak7 (when exposed in isolation, UFLC-ESI TOF chromatographic methodologies regarding the analysis of the 08 60.6min; m/ z 283.20) and peak 10 (76.9min; m/ z 149.02 and 391.28) were carried out in order to obtain the substance of m z [M + H] + 271.24 pure, or at least exhibiting a high degree of purity.

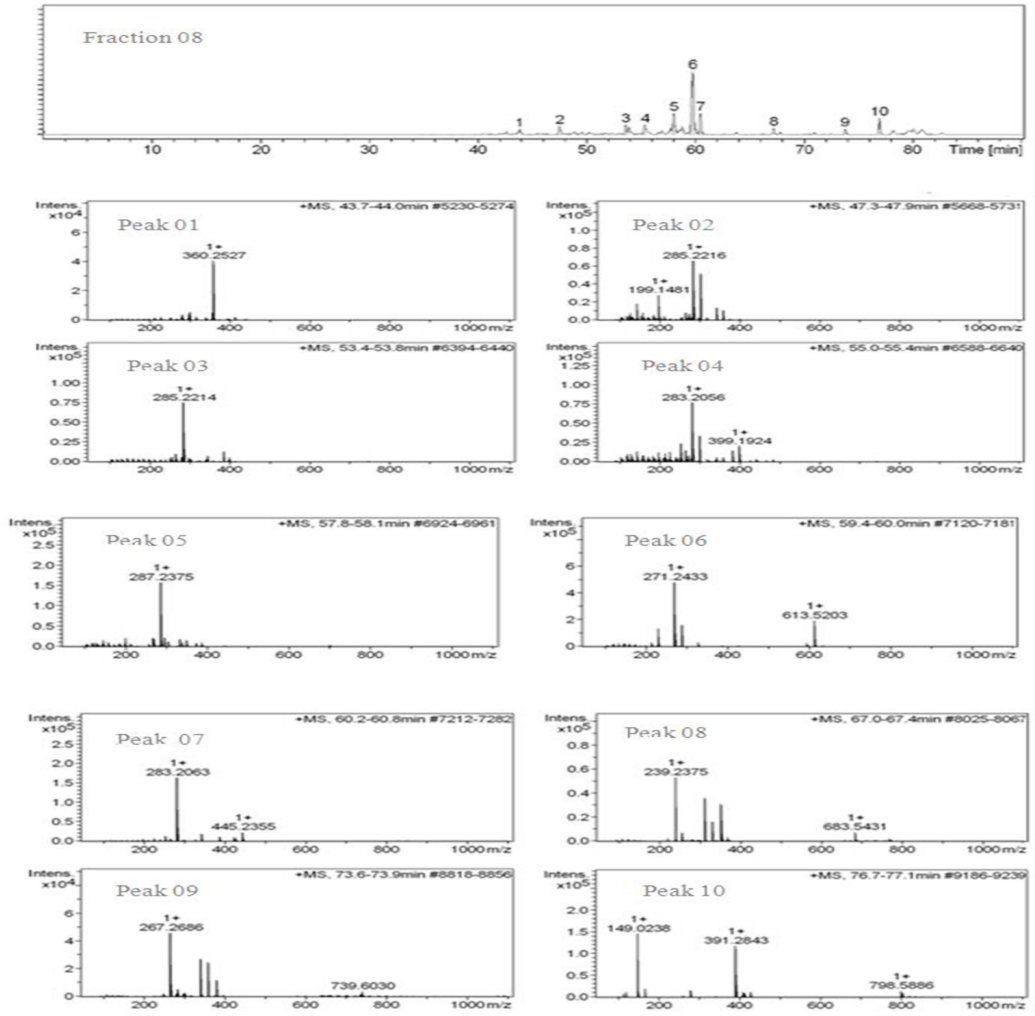


Fig. 5. Chromatogram of fraction 08 of the extract of algae *Cystisrea stricta* L. analyzed b UFLC-ESI TOF

Conclusion

The thin layer chromatography fractionation methodology has proven to be an effective technique as a first step to obtain less complex fractions relative to the chemical composition of the crude extract. However, We have a restriction with respect to the use of large amounts of extract in each application. In order to work around this problem and to speed up this first step of "cleaning" the sample, a dry column fractionation methodology was used, in which the procedure with a larger amount of extract can be performed.

Although the extracts demonstrate great potential as a pharmacological source, the development of an alternative for the treatment 'has been possible only at present depending on the results obtained and to achieve this goal, other studies aimed to elucidate the mechanisms of action of molecules acting together or the evaluation of the activity of other metabolites in isolation.

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تركيب الاحماض الدهنية وعزل المركبات النشيطة بيولوجيا من مستخلص الاستون لسيستوسيرا ستريكتا المحصودة في غرب الجزائر

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الهدف الرئيسي من هذا العمل هو دراسة ملامح الأحماض الدهنية وعزل المركبات النشطة بيولوجيا باستخدام كروماتوجرافيا للطبقة الرقيقة (TLC) وكروماتوجرافيا للعمود(CC). التقييم البيولوجي للتغذية المحتملة لمستخلصات الطحالب البنية لسيستوسيرا ستريكتا .المجمعة من ساحل خضرة بولاية مستغانم (الجزائر). سيستوسيرا ستريكتا اعطت 19.8٪ من الدهون في فصل الشتاء مع تركيب هام من الأحماض الدهنية. دراسة عزل التربينويدات النشطة بيولوجيًا مع تقييم النشاط البيولوجي لمستخلص الأسيتون لسيستوسيرا ستريكتا تم تعريفها بأكبر احتمال لممارسة نشاط مضاد للفطريات ضد *Candida albucans* ATCC 10231 .أدى العزل الكيميائي النباتي إلى عزل مركب نقي 271.24 [M + H] m / z مع عرض أقل. تم إجراء التوضيح الهيكلي على أساس بيانات الرنين المغناطيسي النووي (^{13}C NMR - ^{1}H) بالمقارنة مع الابحاث السابقة المعلن عنها .سيستوسيرا ستريكتا من مصدر جيد للمركبات ضد السلالات الفطرية مثل *Candida albucans* ATCC 10231.