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Study on of Fucoxanthin Content and its Identification in Brown Algae from Padike Vilage Talango District, Madura Islands

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ABSTRACT: This study were aimed to find out the best organic solvent for fucoxanthin extraction from Sargassum filipendula originated from Madura islands and the extracted pigment was also determined and identified. The fucoxanthin of Sargassum filipendula originated from Madura island was extracted with two different organic solvent namely DMSO: Water and Acetone: Methanol: Water. The extracted fucoxanthin were them determined spectroscopic ally and identified using Liquid Chromatography Mass Spectrometric (LCMS). The results show that DMSO: Water is the best organic solvent. Totally most Fucoxanthin from fresh leaf 0, 1957 ± 0,017 g/g. Fucoxanthin orange, including the group xantofil and carotenoids and are slightly water soluble and fat soluble. This pigment is found in many species of brown algae. Fucoxanthin activity is indicated by the nature of the absorption at a wavelength of 400-540 nm. Fucoxanthin has a unique chemical structure because it has a bond alenat and 5.6 monoepoxide within the molecule. In general fucoxanthin found in brown algae in the form of trans-fucoxanthin. Added by Borrow and Sahidi (2008), consists of clusters alenic fucoxanthin and two epoxy groups. LCMS method has been applied to the analysis fucoxanthin of brown algae Sargassum filipendula. Electrospray Ionization methods receipts (ESI) (LCMS) was investigated for the determination of molecular weight. In the positive ion mode molecular ion adduct (M + H) + (M + Na) + (M + K) + adduct of cations were also detected in the presence of an abundance of a cluster dimer trimmer. Identified by LCMS, to determine for molecular weight (MW) that the compound has a BM fucoxanthin 658.77.

Key Words: Fucoxanthin, LCMS, Madura Islands

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INTRODUCTION

Seaweed has been popular especially in Japan, China and Korea as one of the main components in the diet daily [1]. Brown seaweed contain carotenoid pigments are attractive as a source of antioxidants and anti-cancer as reported by Mori et al. [2].

Sargassum Sp contains a large amount of dye that is fucoxanthin and other substances that act as anti-obesity agent [1], antioxidants [3, 4], anticoagulants [5], anti-diabetes [6], anti-cancer [4], anti-tumor and colon cancer [7,8]. Fucoxanthin as the major part of the carotenoid in the brown seaweed has certain alenic bond, in which 5, 6 - monoepoxida play an important role in the structure of fucoxanthin [9].

This study were aimed to find out the best organic solvent for fucoxanthin extraction from Sargassum filipendula originated from Madura islands and the extracted pigment was also determined and identified.

MATERIALS AND METHODS

Materials used in this study include the main ingredients and chemicals. The main material used is the brown alga Sargassum cinereum, Sargassum echinocarpum, Sargassum filipendula, conoides, and padina australis. The chemicals used were DMSO (Dimethil sulfoxide) (Pro analysis), acetone, methanol, hexane, ethyl acetate, diethyl ether, IPA, PA toluene, water, saturated salt solution,, silica gel 60, silica gel F-254 , aluminum foil, paper coarse filter, fine filter paper, paper towels, argon gas (sea sand).

The sampling method used a GPS (Global Positioning System) in order to determine the location coordinates of the point were observed (113.94444°E - 7.08795°S, 113.94231°E - 7.08913°S, 113.94548°E - 7.08911°S 113.94347°E and - 7.08999oS).

To obtain a homogeneous sample of seaweed species Sargassum sp, from the coastal boundary lanes 1 and 2 are determined by the sampling interval distance of each other lanes = 50 m, perpendicular to the beach, sampling each lane was taken at a depth of 1 m to 1.5 m as much as 3 kg of wet seaweed, so that from 6 lanes obtained 18 kg of wet seaweed.

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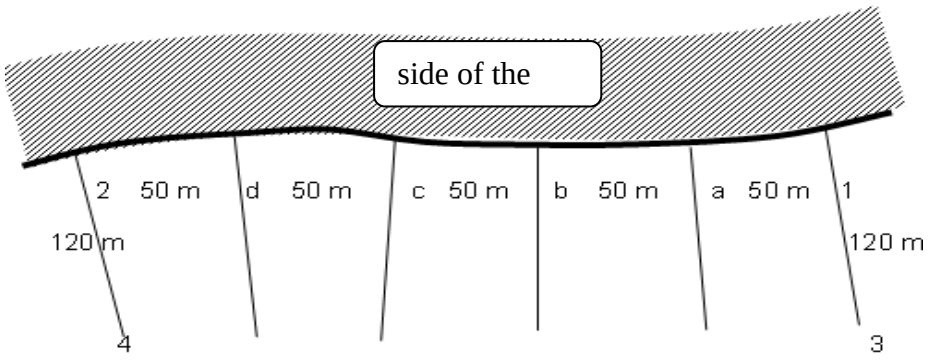

Figure 1. Lay out the sampling of seaweed on the beach of Padike village, Talango district.
Initial sample handling after being taken from the sea: 1) Seaweed washed with fresh water while still attached to remove impurities (such as sand, rocks and mud) to clean and drained. 2) Wet weight was weighed and put in black plastic. 3) Included in the cool box then brought to Malaysia. Determination of the location based on the following considerations: a. Far from industrial pollution; b. There is no river estuary; c. Far from the settlements.

RESULTS and DISCUSSION

Based on data from measurements of mass spectra of samples shows that the chemical compounds in the samples with the following characteristics: there are three molecular ion fragments with the highest abundance (base peak) of these fragments is 658.77 m / z are also suspected as Fucoxanthin molecular weight compounds. Fragmentation resulting list can be seen in Table 1.

Table 1. Fractions Fucoxanthin ion molecule compounds contained in the Sargassum fillipendula.

No.	Ion mass (m/z)	Allegations of molecular ion fragments
1.	682,87	$C_{42}H_{58}O_6$-Na
2.	681,23	$C_{42}H_{58}O_6$-Na
3.	658,77	$C_{42}H_{58}O_6$
4.	640,80	$C_{42}H_{56}O_5$

From the image data obtained that the first peak is the molecular weight of 658.77 fucoxanthin with m / z while the second peak is the molecular weight of 640.80 m / z which is thought to occur dehidro fucoxanthin removal of water and a third peak 681.23 m / z is the moment analysis there is the addition of Na ions (which is attached to the ion H-). And the fourth peak of Na atoms there is an abundance of isotopes with a molecular weight of 682.87 m / z (Kardono, et al 2010).

The results were analyzed by LCMS fucoxanthin extraction as for the data obtained:

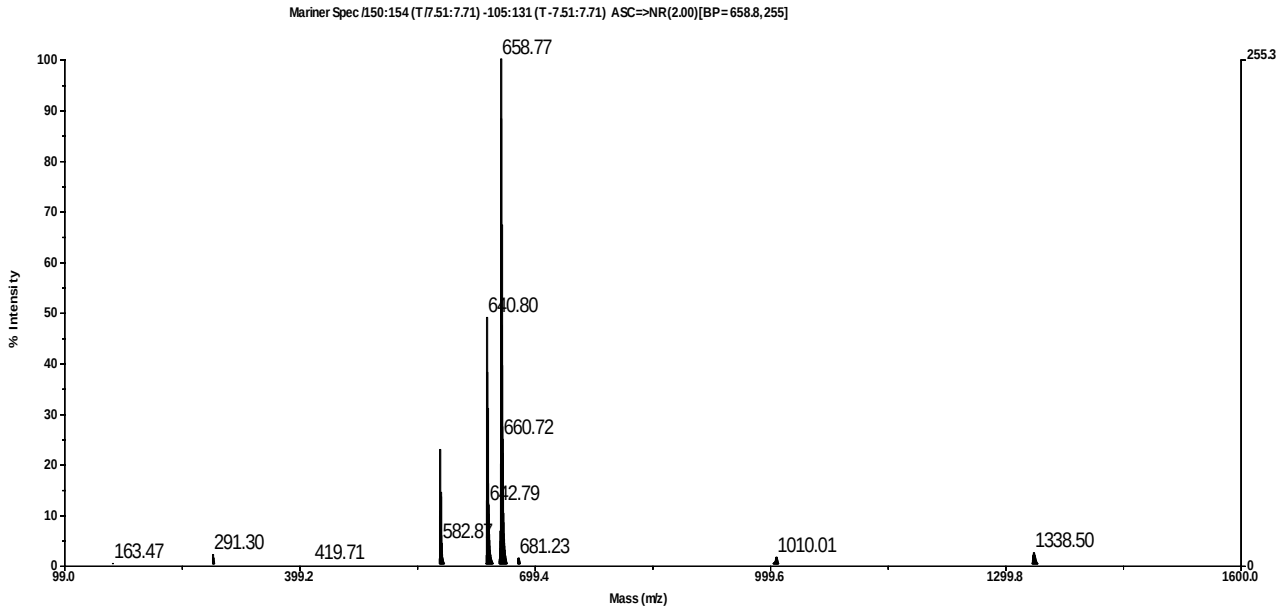

Figure 2. Adducts or Pseudomolecular Ion Formation. M+ = 658,77; M+Na = 681,23; BM = 658,77; 2M + Na = 1388,50

Using the method of ionization and LC / MS Interfaces (L Ruth, 2005), Sangeetha Ravi Kumar, Bhaskar Narayan, Sounder Divakar, and Vallikannan Basakaran. In this research report that to obtain a pure fucoxanthin can be detected LCMS m/z contained molecular weight = 658.1. Garside and Riley [10] reported a molecular weight measurement by mass spectrophotometer fucoxanthin showed pure compounds having a molecular weight of 658 consists of a group of molecules acetil and two hydroxyl groups.

Table 2. Calculation of molecular weight fukosantin ($C_{42}H_{58}O_6$) with LCMS chromatogram.

No	Element	calculate	Result m/z	Analysis m/z
1.	C	12,000000 x 42	504,00000	
2.	H	1,007825 x 58	58,45385	
3.	O	15,994915 x 6	95,96949	
Total			658,42334	658,7682
Margin calculation			658,7682 - 658,42334 = 0,34486	

Content Data Fucoxanthin

Fucoxanthin pigment content results in this study of brown algae *Sargassum filipendula* is calculated by the equation Gross et al., with three replications. Fucoxanthin pigment content from Sargassum Filipendula is 0.1957 ± 0.0173 (mg/gr sampel).

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