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Submission author: Heriyanto Heriyanto  
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Submission title: Composition of the Main Dominant...  
File name: 2018-Brotosudarmo\_et\_al.pdf  
File size: 1.39M  
Page count: 9  
Word count: 5,098  
Character count: 27,696  
Submission date: 19-Mar-2018 09:55AM (UTC+0700)  
Submission ID: 932337127

Philippine Journal of Science  
147 (1): 47-55, March 2018  
ISSN 0031-7683  
Date Received: 05 Jan 2017

1<sup>st</sup> Draft: 9 pages  
Date Printed: 09/22/17  
09:23 A.M.  
6\_MS\_17-001R

### Composition of the Main Dominant Pigments from Potential Two Edible Seaweeds

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Two seaweed species—*Kappaphycus alvarezii* (Rhodophyta) and *Padina australis* (Phaeophyta) – have been commercially viable raw materials for the food industry. Despite their usefulness as sources of carrageenan and alginate, there is little information concerning their chlorophylls and carotenoids. Composition and quantification of the chlorophylls and carotenoids in *K. alvarezii* var. *brava* and *P. australis* were studied using reverse-phase high-performance liquid chromatography (RP-HPLC) with a recently developed 3D-multi-chromatogram analysis method. Identification of the most dominant pigments was confirmed by mass spectrometry using positive electron spray ionization. Samples were collected from three different locations in Indonesia (Jepara, Madura, and Maluku). A total of 29 pigments were found from the crude extracts of *K. alvarezii* and *P. australis*, and the four main dominant pigments (chlorophyll *a*,  $\beta$ -carotene, fucoxanthin, and zeaxanthin) were quantified by recently developed 3D-multi-chromatogram analysis method. Both seaweeds in three locations had almost similar pigment composition and only a small variation on minor pigments, except for the Maluku Island samples. The relationship between pigment concentration and environmental factor of solar irradiation was investigated using the pigment ratio between chlorophyll *a* and main carotenoids. The effect of solar irradiance on pigment formation is discussed.

Keywords: 3D-multi-chromatogram, carotenoid, chlorophyll, *Kappaphycus alvarezii*, *Padina australis*

#### INTRODUCTION

*Kappaphycus alvarezii* (Doty ex PC. Silva 1996) is an introduced-species, which has been mono-cultivated as the largest seaweed commodity not only in Indonesia, but also in other tropical Asian countries. Indonesia is currently leading the production of *K. alvarezii* with nearly  $1.5 \times 10^6$  tons in 2009, driven by the increasing

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demand for  $\kappa$ -carrageenan (Meinita et al. 2012). Another potential seaweed is *Padina australis* (Haeck 1887), a native species of brown seaweed that is increasingly being cultivated and studied as source of alginate (Widyantini 2012). In addition to carrageenan and alginate, *K. alvarezii* and *P. australis* are also rich sources of natural pigments that have other additional biological functions (i.e., antioxidant, anti-obesity, anti-inflammation, and anti-hyper cholesterol) as well as natural colorants, depending on the chemical properties of the pigment. However,

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