

UNPROCESSED SEAWEEDS USED AS FOOD OR HERBAL MEDICINE IN
MALAYSIA AND THEIR HEAVY METAL CONTENTS

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**UNPROCESSED SEAWEEDS USED AS FOOD OR HERBAL MEDICINE IN
MALAYSIA AND THEIR HEAVY METAL CONTENTS**

BY

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ABSTRACT

This study was done to identify the unprocessed seaweeds used as food or herbal medicine in Malaysia and to measure their heavy metal content to see whether they are safe to be consumed .

The unprocessed seaweeds used as food are *Caulerpa* sp., *Gracilaria* sp., *Enteromorpha* sp., *Monostroma* sp., *Undaria* sp. and *Porphyra* sp. . Seaweeds used as herbal medicine are *Sargassum* sp., *Ulva* sp., *Laminaria* sp., and *Hizikia* sp. . Seaweeds used as food were prepared by cooking the seaweeds in soup or as vegetable dishes, or merely eaten as fresh salad . Seaweeds used as herbal medicine are prepared by boiling the seaweeds in water for one hour and its decoction is drunk for health and necessary purpose . These seaweed products are either local or imported species . The local species include *Caulerpa* sp., *Kappaphycus alvarezii*., *Eucheuma denticulatum* from Sabah while the imported ones are from China (*Porphyra* sp., *Ulva* sp., *Laminaria* sp., *Sargassum* sp., *Hizikia* sp.), Japan (*Undaria* sp., *Enteromorpha* sp., *Monostroma* sp., *Laminaria* sp.), and USA (*Hizikia* sp., *Chondrus* sp.) . All of these imported ones were very much available in supermarkets and traditional Chinese herbal stores whereas the local ones were all available in wet markets near to the harvesting location . Prices of seaweed products from China and local seaweeds were relatively cheaper compared to those from USA and Japan . Also these were more commonly consumed because they are nutritious and are cheaper compared to prices of vegetables as well as ordinary tea leaves in Malaysia .

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Generally, these seaweed products are safe to be eat and its decoction are safe to be drank as it abides by the legally permitted limit except for the following : *Porphyra* sp. has a total concentration of $2.47 \mu\text{g Cd} \cdot \text{g}^{-1}$ compared to 1 in health standards, *Ulva* sp. has $34.40 \mu\text{g Zn} \cdot \text{g}^{-1}$, *Hizikia* sp. has $30.33 \mu\text{g Zn} \cdot \text{g}^{-1}$, *Undaria* sp. has $41.05 \mu\text{g Zn} \cdot \text{g}^{-1}$, *Eucheuma* sp. has $40.17 \mu\text{g Zn} \cdot \text{g}^{-1}$, compared to $30 \mu\text{g} \cdot \text{g}^{-1}$ of Zn in health standards and *Eucheuma* sp. has a total concentration of $50.98 \mu\text{g Cu} \cdot \text{g}^{-1}$ compared to $40 \mu\text{gCu} \cdot \text{g}^{-1}$ in health standards.

However, overall these slightly exceeded the legally health standards. The total concentration of metals and the exceeded levels of metals may be either due to the capability of accumulate metals in the under water environment and the contamination of the seaweeds during storage and packing .

ABSTRAK

Tujuan kajian ini adalah mengidentifikasikan species rumpai laut yang tidak diproses , yang diguna sebagai makanan atau ubat herba, yang terdapat di Malaysia dan juga menyiasat kandungan logam beratnya untuk menentukan samada mereka adalah selamat dimakan .

Rumpai laut tidak diproses yang diguna sebagai makanan adalah *Caulerpa* sp., *Gracilaria* sp., *Enteromorpha* sp., *Monostroma* sp., *Undaria* sp. dan *Porphyra* sp. Rumpai laut yang diguna sebagai ubat herba terdiri daripada *Sargassum* sp., *Ulva* sp., *Laminaria* sp., and *Hizikia* sp. . Makanan rumpai laut disediakan dengan memasak sup dengannya atau sebagai makanan lauk atau dimakan begitu sahaja sebagai 'salad' . Rumpai laut disedia sebagai ubat herba dengan memasak rumpai laut dalam air untuk satu jam dan airnya diminum untuk tujuan kesihatan dan penyembuhan penyakit. Produk rumpai laut yang dikumpul daripada pasaran Malaysia boleh dikategorikan kepada species rumpai laut tempatan dan juga yang diimport. Species tempatan termasuk : *Caulerpa* sp., *Kappaphycus alvarezii* , *Eucheuma denticulatum* daripada Sabah manakala rumpai laut lain yang diimport daripada negara China (*Porphyra* sp., *Ulva* sp., *Laminaria* sp., *Sargassum* sp., *Hizikia* sp.), negara Jepun (*Undaria* sp., *Enteromorpha* sp., *Monostroma* sp., *Laminaria* sp.), dan USA (*Hizikia* sp., *Chondrus* sp.) . Kesemua rumpai laut diimport boleh didapati dengan mudah di kompleks membeli belah dan kedai ubatan Cina tradisional manakala jenis rumpai laut tempatan kesemuanya boleh didapati di pasar yang biasanya berhampiran dengan tempat hasil rumpai laut dikumpul. Harga produk rumpai laut dari negara China dan tempatan adalah lebih murah berbanding

dengan yang diimport dari negara Jepun dan USA . Juga rumpai laut ini biasa dimakan kerana mereka adalah berkhasiat dan murah berbanding dengan harga sayuran lain dan daun teh di Malaysia .

Secara amnya, produk rumpai laut ini selamat dimakan dan diminum airnya kerana ia memenuhi aras keselamatan kecuali bagi species yang berikut : *Porphyra* sp. mempunyai jumlah kepekatan $2.47 \mu\text{g Cd} \cdot \text{g}^{-1}$ berbanding dengan $1 \mu\text{g Cd} \cdot \text{g}^{-1}$ dalam piawai keselamatan, *Ulva* sp. mengandungi $34.40 \mu\text{g Zn} \cdot \text{g}^{-1}$, *Hizikia* sp. mengandungi $30.33 \mu\text{g Zn} \cdot \text{g}^{-1}$, *Undaria* sp. mengandungi $41.05 \mu\text{g Zn} \cdot \text{g}^{-1}$, *Euclima denticulatum* mengandungi $40.17 \mu\text{g Zn} \cdot \text{g}^{-1}$, berbanding dengan $30 \mu\text{g} \cdot \text{g}^{-1}$ zink dalam piawai keselamatan dan *Euclima denticulatum* mengandungi jumlah kepekatan $50.98 \mu\text{g Cu} \cdot \text{g}^{-1}$ berbanding dengan $40 \mu\text{g Cu} \cdot \text{g}^{-1}$ dalam piawai keselamatan .