A Practical Guide to
Quality Infrastructure for Tropical Seaweed-to-Carrageenan Value Chains

with focus on the BIMP-EAGA region of ASEAN in the Coral Triangle

BIMP - EAGA

asean

gtz
Deutsche Gesellschaft für
Technische Zusammenarbeit (GTZ) GmbH

This monograph is the product of a private-public partnership project of SEAPlant.net and GTZ

SEAPlant.net
Foundation

SEAPlant.net Monograph no. HB2D_1209_V2_GTZ

Click to table of contents

TABLE OF CONTENTS

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SEAPlant.net can immediately offer testing services for shipments leaving Makassar, Surabaya and Jakarta.

Contact us at:
Seaplant.net Foundation, C/O BaKTI, Jalan Dr. Sutomo No. 26, Makassar 90113, Sulawesi Selatan, Indonesia, Fax : (62 411) 365 0323, Email: contact@seaplant.net, URL: http://www.seaplant.net

GLOSSARY

AlgaeBASE.org – definitive source of taxonomic classification for marine algae

ATC - alkali-treated chips made from eucheuma seaplants

Business transaction - a logical unit of business that is conducted by two or more enterprises and involves the transfer of liquid resources according to mutually accepted systems of governance.

Cottonii – Kappaphycus spp.

Cultivar – A clone derived from vegetative propagation originating from a single seaplant thallus.

End-user – an enterprise that utilizes as-is or further-processed ingredient building-blocks or ingredient solutions in goods that are purchased by wholesale and retail enterprises.

Enterprise core - is a purpose that powers it and the capabilities that enable it to effectively utilizes its resources.

EU – European Union

Eucheuma - "spinosum" of the trade; a seaplant source of iota carrageenan.

Eucheuma seaplants – Betaphycus, Kappaphycus and Eucheuma

EUREPGAP - Euro Retailer Produce Working Group (EUREP) on standards and procedures for the development of Good Aquaculture Practices (GAP) in conventional agriculture

FAO – United Nations Food and Agricultural Organization

Firm resources - used in day-to-day process operations. They can be "liquidated" for use as liquid resources.

Further processor – an enterprise that purchases - building blocks for further refinement.

Governance system - specifies the mutually agreed terms and conditions that apply to each transaction; they specify how any disputes will be settled; and they settle things when disputes happen.

GTZ - Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH

HACCP - Hazard Analytical Control Points requirements

Hierarchical governance - based on explicitly defined systems of authority, rank and layered reporting relationships that are typified by the presence of powerful leaders.

IBB - Ingredient building-blocks

Ingredient building-blocks – products derived or extracted purely from one defined source of raw material and then sold to further-processors or solution providers.

IP - Intellectual property

ISO - International Organization for Standardization

IT – information technology

JaSuDa – Jaringan Sumber Daya (Source Net), a program of SEAPlant.net.

TSV – tropical seaweed-to-carrageenan value-chains

USFDA – United States Food and Drug Administration

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SEAPlant.net Monograph no. HB2D_1209_V2_GTZ

BACKGROUND

This e-book is an update of the 2008 e-book entitled *Quality Assurance, Governance Systems and Good Practices for Tropical Seaweed-to-Carrageenan Value Chains*. It complements an online version. This practical guide is provided as a portal to knowledge, information, tools and solutions that negotiate the tangled web of rules, regulations, standards, tests and other requirements that increasingly make life complicated for industry stakeholders whether they be seaweed farmers, processors or end-users.

Specialty chemicals businesses such as the carrageenan business are in a constant state of change and comprehensive standards for carrageenan and agar in the BIMP-EAGA region have yet to be adopted although draft standards are under development. Consequently this is a "living document" that is being updated periodically. We heartily welcome suggestions and guidance from the users of this guide.

Iain C. Neish & Boedi S. Julianto, December, 2009, Makassar, Sulawesi Selatan, Indonesia

Contact us at: Seaplant.net Foundation, C/O BaKTI, Jalan Dr. Sutomo No. 26, Makassar 90113, Sulawesi Selatan, Indonesia, Fax : (62 411) 365 0323, Email: contact@seaplant.net, URL: http://www.seaplant.net

What this Practical Guide can do for you

This Practical Guide provides access to knowledge, information, tools and solutions that facilitate governance in tropical seaweed-to-carrageenan value chains (TSV). This means:

- minimizing shrinkage and other costly risk factors
- avoiding poor decisions caused by poor information
- minimizing dysfunctions between value chain links

The need for improved governance of tropical seaweed value chains has been evident for several years. Cottonii supplies have been tight, value-chain dynamics have been opaque and quality issues have created considerable value-chain friction. The intensity of a need for value chain governance systems became very evident during the cottonii crisis of 2008-2009 (Figure 1).

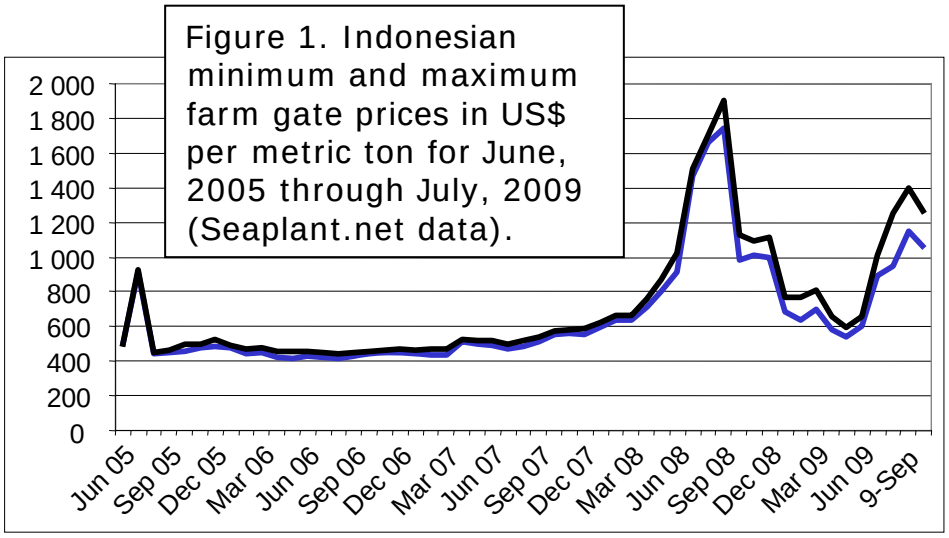


Figure 1. Indonesian minimum and maximum farm gate prices in US$ per metric ton for June, 2005 through July, 2009 (Seaplant.net data).

The decision to publish this Practical Guide and to mobilize **www.seaplant.net/bimpeaga** was reached as a result of value chain studies and stakeholder meetings sponsored by GTZ, IFC and ADB during 2006-2007. The need was punctuated by the extremely active participation of industry and other seaweed stakeholder groups at the First Indonesia Seaweed Forum in Makassar on October 27-30, 2008. It was concluded that future events such as the 2008 cottonii crisis could be prevented and tropical seaweed-to-carrageenan value chains could become much more sustainable if BIMP-EAGA takes the lead in providing:

KNOWLEDGE PRODUCTS including regulatory constraints and guidelines that are value-chain "show-stoppers".

INFORMATION PRODUCTS – especially decision critical items such as seaweed production and pricing.

TOOLS including open protocols for good practices; test procedures; approved third-party testing providers and transparent tracing of crop provenance.

SOLUTIONS such as an affordable third-party quality assurance **system that enables sellers to assure buyers that they are getting what they pay for.**

This Practical Guide is a step toward linking buyers and sellers to these products and several others that will facilitate functions for integrated global seaweed-to carrageenan value chains.

"KITS" that enable farmer enterprises to link into global value chains

KITS = knowledge + information + tools + solutions = actions

coordinated actions = functions

KNOWLEDGE PRODUCTS

- ✓ Internet portals
- ✓ publications
- ✓ training programs
- ✓ on-line consultancy
- ✓ on-site consultancy

INFORMATION PRODUCTS

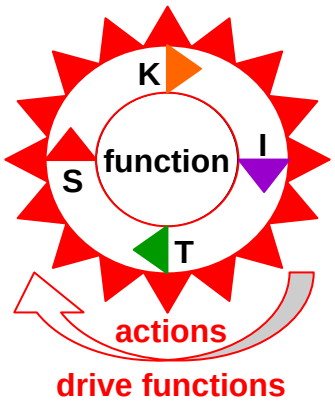
- ✓ news & events
- ✓ publications
- ✓ geographic information system (GIS)
- ✓ links to seaplant communities
- ✓ on-line information exchanges & chat facilities

USEFUL TOOLS

- ✓ Processing systems
- ✓ on-demand enterprise software
- ✓ electronic transaction systems
- ✓ links to materials
- ✓ equipment sources
- ✓ R&D, testing & training facilities

"Knowledge" is a product of education. It enables facts to be utilized, tools to be used and solutions to be implemented.

"Solutions" are the integrated combinations of knowledge, information and tools that result in "**actions**".



"Information" is the mass of facts that enables the effective use of knowledge in developing or obtaining tools and formulating solutions.

"Tools" are the implements or "effectors" that are used to implement solutions.

VALUE SOLUTIONS

- ✓ value chain management
- ✓ best practices
- ✓ testing & verification
- ✓ certification & brand management
- ✓ research & development
- ✓ product & market diversification

ENTERPRISE SOLUTIONS

- ✓ utilizing access & value solutions
- ✓ farmer assistance
- ✓ technical & business training
- ✓ Value-adding facilities
- ✓ tolling systems & value chain links
- ✓ enterprise resource management

ACCESS SOLUTIONS

- ✓ communication & logistics
- ✓ fair finance
- ✓ science & technology
- ✓ strategic alliances
- ✓ fair trade in global markets
- ✓ essential goods & social services

KNOWLEDGE PRODUCTS - CARRAGEENAN

REGULATORY "SHOW STOPPERS"

Legally defined product standards set boundaries for TSV products that must be met. Failure to comply means that product cannot be sold to customers or jurisdictions where the standards apply. Click links to access documents or portals to these standards.

EU - European Union standards for E407a (Processed Eucheuma Seaweed) and E407 (Carrageenan) (e.g. Commission Directive 98/86/EC Nov 1998 & 95/2/EC February 1995)

JECFA - FAO/WHO Joint Expert Committee on Food Additives (JECFA) standards for Processed Eucheuma Seaweed and Carrageenan.

Codex FAO Food and Nutrition Papers 52 Add 9, June 2001) JECFA Specifications.

USFDA – United States Food & Drug Administration standards (USFDA 21 CFR 172:620)

HACCP Hazard Analytical Control Points requirements

ISO 9001 : 2000, Quality Management System

ISO 14001:2004, Environmental Management System

ISO 22000 : 2005, Food Safety Management, Requirement for any organizations in the Food Chain

OHSAS 18001 - Occupational Health and Safety Management Systems Requirements.

REGULATORY GUIDELINES

It is recognized that many standards in TSV are "commercial standards" that are best left to definition between buyers and sellers. In such cases standards should not be imposed but guidelines can be of use.

PNCS - Philippine National Carrageenan Standard (under development). This is also proposed as the basis for a BIMP-EAGA harmonized standard. **It is not be an attempt to force unwanted additional constraints on BIMP-EAGA carrageenan producers.** Rather, it is a tool for harmonizing constraints imposed by legal standards from around the world and ensuring that TSV products that conform to the BIMP-EAGA standard will be acceptable to all major markets.

CAC/GL 60-2006 : Principle for Traceability/ Product Tracing as a Tool within a Food Inspection and Certification System

CAC/GL 38-2001 Rev.1-2005: Guidelines for Generic Official Certificates Formats and the Production and Issuance of Certificates

Basic manufacturing practices for raw-dried seaweed and semi-refined carrageenan from Eucheuma and Kappaphycus SEAPlant.net Monograph no. HB2G 1008 V2 BMP. This is meant as a starting point toward developing Good Manufacturing Practice guidelines especially for process steps that occur near seaweed sources and fall into the category of "post-harvest treatment".

KNOWLEDGE PRODUCTS - AQUACULTURE

REGULATORY GUIDELINES – AQUACULTURE

Carrageenan can be described as being a segment of the "food ingredients business" but the cultivation of seaweeds is part of the "aquaculture business". Standard aquaculture protocols are at their formative stages throughout most of the world but initiatives for TSV stakeholders to monitor and/or participate in include the following:

EUREPGAP - Euro Retailer Produce Working Group (EUREP) on standards and procedures for the development of Good Aquaculture Practices (GAP) in conventional agriculture (General regulations for integrated aquaculture assurance; Control points and compliance criteria for integrated aquaculture assurance; Interpretation guideline to control points compliance criteria integrated aquaculture assurance)

FAO Guidelines for Aquaculture Certification (under development). Includes Fisheries eco-labeling guidelines; control points and compliance criteria; integrated aquaculture assurance; and interpretation guidelines to control points compliance criteria for integrated aquaculture assurance.

Quarantine protocols for tropical seaweeds Sulu, R., Kumar, L., Hay, C. and Pickering, T. 2004. *Kappaphycus seaweed in the Pacific : review of introductions and field testing proposed quarantine protocols*. Noumea: Secretariat of the Pacific Community. (Aquaculture Technical Papers / Pickering) ISSN 1683-7568. Agdex Pacific Islands 395/609. ISBN 982-00-0041-6

TAXONOMIC STANDARDS OF IDENTITY

www.algaebase.org provides comprehensive lists of common names , generic & specific names designated according to internationally recognized systems that enable unequivocal identification of seaweed species. Regulations, standards and protocols are often meaningless unless product identity is unequivocally established. Nomenclature for tropical agar and carrageenan seaweeds are also **provided in this Guide**.

Good aquaculture practices for Kappaphycus and Eucheuma: A compilation of nine training modules for seaweed farmers (SEAPlant.net Monograph no. HB2F 0909 V4 GAP) addresses the issue of identity standards and puts them in a biological context.

RESEARCH AND DEVELOPMENT LINKS

With support and encouragement from GTZ, BIMP-EAGA is in the process of putting together linkages among organizations conducting R & D relevant to the development of tropical seaweed-based value chains. Meanwhile some useful links are:

www.enaca.org – the Network of Aquaculture Centres in Asia-Pacific.

Tropical Red Seaweeds as a Foundation for Integrated Multi-trophic Aquaculture (IMTA); *Four propositions and an action plan for this major opportunity in the Coral Triangle*. (SEAPlant.net Monograph no. HB2E 1209 V2 IMTA).

INFORMATION PRODUCTS

DECISION-CRITICAL INFORMATION

A contributing factor to the 2008 "cottonii crisis" was the lack of timely, reliable decision critical information to stakeholders at all value chain levels – and especially to buyers. SEAPlant.net is contributing toward a solution to this problem by supplying the following products:

An Analysis of the Trade in Tropical Red Seaweed sand their Products 2000-2007 SEAPlant.net Monograph no. HB2B 0808 V2 TD

Structure and Development of Tropical Red Seaweed Value Chains SEAPlant.net Monograph no. HB2A 1008 V1 VC

www.jasuda.net posts price discovery and data crop-logging information. This site is currently only in Bahasa Indonesia but an English language mirror site is in preparation.

GTZ and SEAPlant.net are presently seeking means for getting current trade data from the BIMP-EAGA countries so we can provide the most recent data by month for:

- ports of origin
- product identities
- quantity shipped
- price

These data will be posted on **www.seaplant.net** in the future if there is sufficient industry interest.

OTHER USEFUL INFORMATION

www.jasuda.net posts industry news, notices of meetings and other information of interest to TSV stakeholders. This site is currently only in Bahasa Indonesia but an English language mirror site is in preparation and the site content is constantly expanding.

A reference list for commercially cultivated tropical red seaweeds. (SEAPlant.net Monograph no. HB2I 1008 V3 REF) indexes all of the references used in preparing SEAPlant.net monographs and also includes other references. SEAPlant.net is continually updating and expanding this list and hopes to provide links to many of these documents in the future.

www.seaplant.net links to Agriculture and Industry; Biopolymers; Environment, Society, and Art; Farming and Biotechnology; Nutraceutical, Pharmaceutical and Wellbeing; Sea Vegetables; Seaplant Science and Technology; and Other Links of Interest.

Food and Agricultural Organization of the United Nations (FAO) 2006. State of World Aquaculture 2006. FAO Fisheries Technical Paper No. 500 (FAO Rome), 162 pp. This is a very useful eference with exhaustive treatment of fisheries and aquaculture data.

Tropical Red Seaweeds as a Foundation for Integrated Multi-trophic Aquaculture (IMTA); *Four propositions and an action plan for this major opportunity in the Coral Triangle*. SEAPlant.net Monograph no. HB2E 1209 V2 IMTA. Partly based on FAO 2006.

USEFUL TOOLS

MOVING TOWARD "GOOD PRACTICES"

SEAPlant.net does not presume to have "definitive" best practices but we work with farmer groups and have had to come up with useful starting points. We hope to enlist assistance and support for making these tools more comprehensive and widely accepted:

Good agronomy practices for Kappaphycus and Eucheuma*: including an overview of basic biology.* SEAPlant.net Monograph no. HB2F 1008 V3 GAP

Basic manufacturing practices for raw-dried seaweed and semi-refined carrageenan from Eucheuma and Kappaphycus SEAPlant.net Monograph no. HB2G 1008 V2 BMP

Laboratory test procedures for raw-dried seaweed and semi-refined carrageenan from Eucheuma and Kappaphycus. SEAPlant.net Monograph no. HB2H 1008 V3 LTP

A Ten-step Functional Framework for building Ventures and Alliances among Seaplant Enterprises. SEAPlant.net Monograph no. HB2C 0808 V1 VA

Tropical Red Seaweeds as a Foundation for Integrated Multi-trophic Aquaculture (IMTA); *Four propositions and an action plan for this major opportunity in the Coral Triangle*. SEAPlant.net Monograph no. HB2E 1209 V2 IMTA

LABORATORY TESTING FACILITIES

www. seaplant.net has laboratory testing facilities in Makassar and can undertake simple tests such as shown in (Monograph HB2H 1008 V3 LTP). SEAPlant.net is also in the process of certifying third-party testing facilities to undertake these and such other tests as may be required by buyers and sellers.

TECHNICAL ASSISTANCE AND TRAINING

www. seaplant.net is constantly conducting courses and providing technical assistance related to farm development and capacity building for farmer enterprises.

Some of this material is available through **www.jasuda.net** in Bahasa Indonesia and English language versions are in process. Topics include Guidelines for Trainers; Seaweed and its Applications; Choosing Locations for your Seaweed Farm; Seaweed Farming Techniques; Post Harvest Handling of Seaweeds; Your Seaweed Business; Managing a Seaweed Enterprise; Strong Farm Enterprise Development; Benefiting the Whole Family and the Community; Sustainable Integrated Seaweed Farming

WEB PORTALS

www. seaplant.net and **www.jasuda.net** are both expanding as portals for delivering KITS in English, and Bahasa Indonesia.

TURNKEY GOVERNANCE OF PROVENANCE, RHEOLOGY AND COMPOSITION FOR COTTONII, SPINOSUM AND THEIR PRODUCTS

It is recognized that seaweed suppliers and processors prefer to set commercial standards between themselves and do not want outside parties forcing standards on them any more than food safety and similar standards demand.

On the other hand there are many buyers and many sellers in today's seaweed-to-carrageenan value chains. "modular" and "market" governance prevail (see *Structure and Development of Tropical Red Seaweed Value Chains*). Often buyers and sellers have not yet had a chance to build the trust and the quality assurance systems that enable "relational" governance.

The staff of SEAPlant.net has had extensive experience at operating quality assurance systems for "captive" and "relational" value chains where QA can be done in-house.

There now seems to be a need for third-party QA services that can service the buyer – seller links that prevail today.

AVAILABLE NOW

QUALITY ASSURANCE FOR MAKASSAR, SURABAYA AND JAKARTA – COMING SOON FOR ZAMBOANGA AND CEBU

SEAPlant.net can immediately offer testing services for shipments leaving Makassar, Surabaya and Jakarta. Basic services include:

1. On-site inspection and evaluation of seaweed shipments with photos and written appraisal provided to clients immediately by e-mail;
2. Representative sampling of ten bales per 20 foot container (more if requested) and testing for moisture, sand, salt, raffia, junk weed and other contaminants.
3. Turn-around time within one week.

Cost of this service is about one percent of the FOB value of the seaweed being shipped. It can be more or less depending on the complexity of testing required; the sampling intensity; and the volume of product to be tested.

Please contact us to work out terms at:

boedisj@seaplant.net or **iain@seaplant.net**

Seaplant.net Monographs available at www.seaplant.net/bimpeaga/downloads

These monographs are integral with this Practical Guide supersede and expand upon The Eucheuma Seaplant Handbook Volume I : Agronomics, Biology and Crop Systems (ISBN 979 99558 0 7).

1. ***Structure and Development of Tropical Red Seaweed Value Chains*** SEAPlant.net Monograph no. HB2A 1008 V1 VC

2. ***An Analysis of the Trade in Tropical Red Seaweed sand their Products 2000-2007*** SEAPlant.net Monograph no.. HB2B 0808 V2 TD

3. ***A Ten-step Functional Framework for building Ventures and Alliances among Seaplant Enterprises***. SEAPlant.net Monograph no. HB2C 0808 V1 VA

4. ***Tropical Red Seaweeds as a Foundation for Integrated Multi-trophic Aquaculture (IMTA); Four propositions and an action plan for this major opportunity in the Coral Triangle.*** SEAPlant.net Monograph no. HB2E 1209 V2 IMTA

6. ***Good aquaculture practices for Kappaphycus and Eucheuma: A compilation of nine training modules for seaweed farmers*** by Iain C. Neish, Anicia Q Hurtado, Boedi S. Julianto and Dina Saragih SEAPlant.net Monograph no. HB2F 0909 V4 GAP

7. ***Basic manufacturing practices for raw-dried seaweed and semi-refined carrageenan from Eucheuma and Kappaphycus*** SEAPlant.net Monograph no. HB2G 1008 V2 BMP

8. ***Laboratory test procedures for raw-dried seaweed and semi-refined carrageenan from Eucheuma and Kappaphycus***. SEAPlant.net Monograph no. HB2H 1008 V3 LTP

9. ***A reference list for commercially cultivated tropical red seaweeds.*** SEAPlant.net Monograph no. HB2I 1008 V3 REF

Links & documents available at www.seaplant.net/bimpeaga/downloads

REGULATORY "SHOW STOPPERS"

EU - European Union standards for E407a (Processed Eucheuma Seaweed) and E407 (Carrageenan) (e.g. Commission Directive 98/86/EC Nov 1998 & 95/2/EC February 1995)

JECFA - FAO/WHO Joint Expert Committee on Food Additives (JECFA) standards for Processed Eucheuma Seaweed and Carrageenan.

Codex FAO Food and Nutrition Papers 52 Add 9, June 2001) JECFA Specifications.

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ISO 14001:2004, Environmental Management System

ISO 22000 : 2005, Food Safety Management, Requirement for any organizations in the Food Chain

OHSAS 18001 - Occupational Health and Safety Management Systems Requirements.

REGULATORY GUIDELINES

PNCS - Philippine National Carrageenan Standard (under development). **CAC/GL 60-2006** : Principle for Traceability/ Product Tracing as a Tool within a Food Inspection and Certification System

CAC/GL 38-2001 Rev.1-2005: Guidelines for Generic Official Certificates Formats and the Production and Issuance of Certificates

EUREPGAP - Euro Retailer Produce Working Group (EUREP) on standards and procedures for the development of Good Aquaculture Practices (GAP) in conventional agriculture.

FAO Guidelines for Aquaculture Certification (under development).

Quarantine protocols for tropical seaweeds. Sulu, R., Kumar, L., Hay, C. and Pickering, T. 2004. *Kappaphycus seaweed in the Pacific : review of introductions and field testing proposed quarantine protocols*. Noumea: Secretariat of the Pacific Community. (Aquaculture Technical Papers / Pickering) ISSN 1683-7568. Agdex Pacific Islands 395/609. ISBN 982-00-0041-6

OTHER USEFUL INFORMATION

Food and Agricultural Organization of the United Nations (FAO) 2006. State of World Aquaculture 2006. FAO Fisheries Technical Paper No. 500 (FAO Rome), 162 pp.

TAXONOMIC STANDARDS OF IDENTITY

Genus: Betaphycus Trade name: gelatinae Symbol: BE

Authority: Doty ex P.C. Silva Type species: Betaphycus philippinensis Doty

Classification: Eukaryota, Phylum Rhodophyta, Class Rhodophyceae, Subclass Florideophycidae, Order Gigartinales, Family Areschougiaceae.

Genus: Eucheuma Trade name: spinosum Symbol: EU

Authority: J. Agardh Type species: Eucheuma denticulatum (N.L. Burman) F.S.Collins & Hervey

Common names: Agal agal, Agal agal besar, Agar-agar, Agar agar besar, Agar agar pulau, Agar agar seru laut, Chilin-t' sai, Crude agar, East-Indian Carrageen, Eucheuma, Eucheuman, Java agar, Kirinsai, Makassar weed, Ruwe agar, Ryukyu-tsunomata, Singapore weed, Spinosum, Tosaka nori, Zanzibar weed

Classification: Eukaryota, Phylum Rhodophyta, Class Rhodophyceae, Subclass Florideophycidae, Order Gigartinales, Family Areschougiaceae.

Genus: Kappaphycus Trade name: cottonii Symbol: KA

Authority: Doty Type species: n/a

Commercial species: alvarezii (ALV), cottonii (COT). inerme (INM), interme (INR), striatum (STT), procrusteanum (PRO)

Common names: Agal agal, Agal agal besar, Agar-agar, Agar agar besar, Agar agar pulau, Agar agar seru laut, Chilin-t' sai, Cottonii, Eucheuma, Eucheuman, Guso, Kirinsai

Classification: Eukaryota, Phylum Rhodophyta, Class Rhodophyceae, Subclass Florideophycidae, Order Gigartinales, Family Areschougiaceae.

Genus: Gracilaria Trade name: gracilaria Symbol: GR

Authority: Greville Type species: Gracilaria bursa-pastoris (S.G. Gmelin) P.C. Silva

Commercial species: asisatica (ASI), bursa-pastoris (BUR), caudata (CAU), changii (CHN), chilensis (CHL), cornea (COE), coronopifera (COO), crassissima (CRM), domingensis (DOM), edulis (EDL), eucheumoides (EUC), firma (FIR), fisheri (FIS), folifera (FOL), gracilis (GRA), heteroclada (HET), howei (HOW), lemaneiformis (LEM), longa (LON), pacifica (PAC), parvispora (PAR), salicornia (SAL), tenuistipitata (TET), verrucosa (VEU).

Common names: Agar-agar Caocaoyan, Agar agar (Agal agal) kecil, Ceylon moss Chinese moss Fen tsai, Gulaman, Gulaman dagat

Classification: Eukaryota, Phylum Rhodophyta, Class Rhodophyceae, Subclass Florideophycidae, Order Gracilariales, Family Gracilariaceae.

Comprehensive lists of common names , generic & specific names can be found at www.algaebase.org