PHILIPPINE NATIONAL STANDARD

PNS/BAFS 85:2021
ICS 67.120.30

Raw Dried Seaweeds– Product Standard

BUREAU OF AGRICULTURE AND FISHERIES STANDARDS
BPI Compound Visayas Avenue, Diliman, Quezon City 1101 Philippines
Trunkline: **(632) 928-8741 to 64 loc. 3301-3319**
E-mail: **info.dabafs@gmail.com**
Website: **www.bafs.da.gov.ph**

Foreword

In 2018, the Philippine Council for Agriculture and Fisheries (PCAF) - Committee on International Trade (CIT) endorsed PCAF-CIT Resolution No. 5, series of 2018 (Recommending that DA Develop a Position on the Aquaculture Stewardship Council [ASC] and the Marine Stewardship Council [MSC] Private Seaweed Standard and Recommend the same to the Senior Official Meeting- Ministers on Agriculture and Forestry [SOM-AMAF] for an ASEAN Position as a Strategy to Defend the Seaweed Industry from Potential Technical Barriers to Trade [TBT] in the Export Market) to the Bureau of Agriculture and Fisheries Standards (BAFS) recommending the review of all seaweed-related standards to address the recent developments under the Aquaculture Stewardship Council (ASC) and the Marine Stewardship Council (MSC) seaweed sustainability standard. In response, the BAFS initiated the amendment of Philippine National Standards (PNS) on raw dried seaweeds (PNS/BAFPS 85:2012) in order to align with the ASC and MSC seaweed standards and meet current international requirements on food safety, quality, and sustainability.

A Technical Working Group (TWG) was created through Special Order (SO) No. 1092, series of 2018 (Creation of Technical Committees [TC] and its TWG for the Development of PNS for Agriculture and Fisheries Products, Machinery, Tools, and Equipment), SO No. 442, series of 2020 (Creation of TC and its TWG for the Development of PNS for Agriculture and Fisheries Products, Machinery, and Structures), and SO No. 81, series of 2021 (Creation of TWG for the development of PNS for Agriculture and Fishery Products, Machinery, Tools, and Equipment). The TWG was composed of representatives from government agencies, academe/research institutions, non-government organization, and private sector. The draft PNS underwent a series of consultations and TWG meetings via face-to-face and online platforms before it was finalized and approved by the DA Secretary.

This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2.

Contents

1 Scope

This standard prescribes quality specifications and food safety requirements of raw dried seaweed belonging to phylum Chlorophyta (green seaweed), Ochrophyta (brown seaweed) and Rhodophyta (red seaweed) such as but not limited to *Ulva* spp., *Sargassum* spp., *Gracilaria* spp., *Kappaphycus* spp., and *Eucheuma denticulatum*. *Kappaphycus* spp. and *E. denticulatum* are commercially known as “Cottonii” and “Spinosum”, respectively.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their contents constitute requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Bureau of Agriculture and Fisheries Standards (BAFS) – Department of Agriculture (DA). (2021). Philippine National Standard (PNS) on the Code of Good Aquaculture Practices (GAqP) for seaweeds (PNS/BAFS 208:2021). http://www.bafs.da.gov.ph/databases

Bureau of Fisheries and Aquatic Resources (BFAR) – DA. (2014). Regulations on the collection, harvesting, gathering, selling and exporting of Sargassum spp. (Fisheries Administrative Order [FAO] 250-2). https://www.bfar.da.gov.ph/files/img/photos/FAO250-2.pdf

Codex Alimentarius Commission (CAC). (2010). Guidelines on the application of general principles of food hygiene to the control of pathogenic Vibrio species in seafood (CAC/GL 73-2010). http://www.fao.org/fao-who-codexalimentarius/codex-texts/guidelines/en/

CAC. (2012). Guidelines on the application of general principles of food hygiene to the control of viruses in food (CAC/GL 79-2012). http://www.fao.org/fao-who-codexalimentarius/codex-texts/guidelines/en/

CAC. (2019). Code of practice for fish and fishery products (CAC/RCP 52-2003 Rev. 12). http://www.fao.org/input/download/standards/10273/CXP_052e.pdf

CAC. (2020). General principles of food hygiene (CAC/RCP 1–1969 Rev. 4). https://www.loex.de/files/downloads/lebensmittel/Codex%20Alimentarius%20(EN).pdf

Food and Drug Administration (FDA) - Department of Health (DOH). (2014). Rules and regulations governing the labeling of prepackaged food products distributed in the Philippines (FDA Regulation No. 2014-0030). https://www.fda.gov.ph/administrative-order-no-2014-0030-a/

Republic of the Philippines. (1976). The Code on Sanitation of the Philippines (Presidential Decree No. 856). https://doh.gov.ph/sites/default/files/publications/code_on_sanitation_phils.pdf

3 Terms and Definitions

For the purpose of this standard, the following terms and definitions shall apply.

3.1
adulteration
intentional act of addition or mixing of any substance that will increase its bulk or weight for unscrupulous economic gain or increase in profit such as the addition of commercial salt

3.2
brown seaweed
light or dark brown in color, characterized by the presence of chlorophylls *a* and *c* and fucoxanthin

3.3
bulk sample
combination and/or mixture of primary samples taken with a sampling device

3.4
class
designation of raw dried seaweed quality according to the established government standard thereof

3.5
contaminant
any biological or chemical agent (fertilizers among others) and residue, heavy metal, foreign matter, or other substances not intentionally added to raw dried seaweed, which may compromise food safety and suitability for its intended use

3.6
green seaweed
light or dark green in color, characterized by the presence of chlorophylls *a* and *b*

3.7
impurities/debris
other seaweeds (not covered in the scope of the standard), plastic materials (e.g., fragments of soft plastic tie-ties, nylon rope, and sacks), styropor fragments, wood,

dirt, coralline particles, crustaceans and molluscan shells, other invertebrates, sand, and other foreign matters

3.8
laboratory sample
quantity of seaweed removed from the bulk sample intended for analyses or other examination

3.9
lot
composed of seaweed belonging to the same species intended to be uniform in characteristics and has undergone similar post-harvest treatment

3.10
moisture content
amount of water present in the dried seaweed, expressed as percentage (%)

3.11
primary sample
small quantity of seaweed taken from a bag/bale in a particular lot

3.12
purity
classification of raw dried seaweed as mono species, congeneric, or mixture of genera

3.13
raw dried seaweed
freshly harvested cleansed seaweed that is either sun or air dried

3.14
red seaweed
color ranges from green, red, brown, yellow, orange, purple, to black, characterized by the presence of chlorophylls *a* and *d* and phycobiliproteins (r-phycocyanin and phycoerythrin)

3.15
seaweed
macroscopic algae belonging to phylum Chlorophyta (green seaweed), Ochrophyta (brown seaweed) and Rhodophyta (red seaweed). It also applies to species both with food and non-food applications

4 Requirements

4.1 Raw dried seaweed should be of one genus or species only.

4.2 Seaweed for drying purposes should follow the following:

4.2.1 *Kappaphycus* and *Eucheuma* harvested from farms should be mature, having a culture period of at least 45 days.

4.2.2 *Gracilaria*, cultured in seaweed farms and wild stock should have a culture period in accordance with Annex A (Maturity of Seaweeds) as specified under PNS/BAFS 208:2021 (Code of GAqP for Seaweeds).
4.2.3 *Sargassum* gathered from the shore should adhere to the provisions of the BFAR-DA FAO 250-2 (Regulations on the Collection, Harvesting, Gathering, Selling and Exporting of *Sargassum* spp.) or Clause 6.1 of the PNS/BAFS 208:2021 (Code of GAqP for Seaweeds), whichever is applicable.
4.2.4 *Ulva* gathered from the wild stock should comply with applicable regulations.

4.3 Adulteration of raw dried seaweed should be prohibited. Raw dried seaweed should meet the following criteria as shown in Table 1.

Table 1 – Specifications for raw dried seaweed

Criteria	***Gracilaria* spp.**	***Eucheuma denticulatum***	***Kappaphycus* spp.**	***Sargassum spp.***	***Ulva* spp.**	**Test methods**
Moisture content (MC), (%)	16-18	35-38	35-38	10-12	16-18	Annex A
Impurities (% max)	-	3	3	-	-	Annex B
Salt as KCl (% max)	-	20	25	-	-	Annex C
Sand, (% max)	-	1	1	-	-	Annex C
Color	purple	purple to different shades of brown	purple to different shades of brown	dark brown	light green	Visual

5 Classification according to quality

5.1 Raw dried seaweeds (*Kappaphycus* spp. and *Eucheuma denticulatum*) should be classified based on the quality criteria presented in Tables 2 and 3, respectively:

Table 2 – Classification for *Kappaphycus* spp.

Class	**Moisture Content (% max)**	**Impurities (% max)**	**Salt as KCl (% max)**	**Sand (% max)**	**Purity**	**Minimum days of culture**	**Days of drying**
A	35	3	25	1	mono	45	3-5
B	38	3	25	1	mix conge neric	45	6-7

Class	Moisture Content (% max)	Impurities (% max)	Salt as KCl (% max)	Sand (% max)	Purity	Minimum days of culture	Days of drying
C	40	3	25	1	mix of other genus	45	>7

Table 3 – Classification for *Eucheuma denticulatum*

Class	Moisture Content (% max)	Impurities (% max)	Salt as KCl (% max)	Sand (% max)	Purity	Minimum days of culture	Days of drying
A	33	3	20	1	mono	45	3-5
B	35	3	20	1	mix congeneric	45	6-7
C	38	3	20	1	mix of other genus	45	>7

6 Tolerances

In all classifications, one (1) kilogram (kg) sample of dried seaweed should pass the analyses for moisture content, impurities, salt (as KCl), and sand for a lot to be allowed for each shipment.

7 Contaminants

The product should comply with the Maximum Residue Levels (MRLs) established by the Codex Alimentarius Commission and/or competent authority for this commodity.

8 Hygiene and handling

8.1 The products should be prepared following the Sanitation Standard Operating Procedure (SSOP) of Presidential Decree No. 856, series of 1975 (Code on Sanitation of the Philippines) and processed under hygienic conditions in accordance with the FDA-DOH Revised Rules and Regulations Governing the Labeling of Prepackaged Food Products Distributed in the Philippines (FDA Regulation No. 2014-0030) and its future amendments.

8.2 The products covered by the provisions of this standard should be prepared and handled in accordance with the following relevant Codex standards such as:

8.2.1 Codex Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003);
8.2.2 Codex Guidelines on the Application of General Principles of Food Hygiene to the Control of Viruses in Food (CAC/GL 79-2012);

8.2.3 Codex Guidelines on the Application of General Principles of Food Hygiene to the Control of Pathogenic Vibrio Species in Seafood (CAC/GL 73-2010); and
8.2.4 Codex General Principles of Food Hygiene (CAC/RCP 1-1969 – Rev 4 2020).

9 Packaging, labeling, and storage

9.1 Packaging

9.1.1 Seaweed should be packed in appropriate containers that will adequately protect the product from normal hazards of transportation and handling.

9.1.2 The product should be packaged in appropriate food grade materials, which are clean and free from any foreign matter or contaminant. Product should not be packed in bulk with mixed species.

9.2 Labeling

The product label should include pertinent instructions for use such as proper storage, preparation, and cooking as indicated in the provisions of the Codex General Standard for the Labeling of Prepackaged Foods (CXS 1-1985) and the Revised Rules and Regulations Governing the Labeling of Prepackaged Food Products Distributed in the Philippines (FDA-DOH Regulation No. 2014-0030) and its future amendments.

9.2.1 The trader and farmer should label each baled sack with the following information, if appropriate.

Trader/Buyer	Farmer
● Source of the product ● Species/trade name ● Net weight in kilograms ● Name and address of the source ● The words “Product of the Philippines”	● Source of the product (farm name/association, farmer, and location) ● Species/trade name ● Net weight in kilograms ● Date planted and harvested ● Days of drying

9.2.2 Retail package/container

Each retail product package, if applicable, should be labeled and marked with the following information:

9.2.2.1 The name of the product should be “Raw Dried” and the corresponding English or common/local name with its scientific name in parenthesis, e.g., Raw Dried Cottonii - (*Kappaphycus alvarezii*). The products may be called by other common/local names provided that such names are accepted in the country of distribution;

9.2.2.2 The net content by weight in the metric system and/or number of pieces. The net weight based on other systems of measurement required by importing countries should appear in parenthesis after the metric net weight;

9.2.2.3 The label should state that the product should be stored under conditions to maintain the best quality during transport, storage, and distribution;

9.2.2.4 The name and address of either of the following: manufacturer, packer, distributor, importer, exporter or vendor;

9.2.2.5 The lot identification code/number;

9.2.2.6 The words “Product of the Philippines”;

9.2.2.7 The pictorial presentation (optional) of the product on the label should not mislead the consumer with respect to the product so illustrated; and

9.2.2.8 The words “best before” followed by the day, month and year as far as practicable indicating end of the period at which the product shall retain its optimum quality attributes at a stated storage condition.

9.2.3 Non-retail container

Information on the above provisions should be given either on the container or in accompanying documents, except that the name of the product, lot identification, and the name and address of the manufacturer or packer as well as storage instructions, should appear on the container. However, the lot identification and the name and address of the manufacturer or packer may be replaced by an identification mark, provided that such mark is clearly identifiable with the accompanying documents.

9.3 Storage

Keep the packed seaweeds in a secured dry storage area.

10 Sampling

Sampling method to be used for ascertaining conformance to the requirements of this specification should be in accordance with Annex D (Method of Sampling).

11 Defectives

The sample unit should be considered as defective when it exhibits any of the properties defined below.

11.1 Impurity

The presence in the sample unit of impurity other than salt and sand of more than 3%.

11.2 Higher moisture content

The presence in the sample unit of moisture content of more than 35-38% for *Kappaphycus* spp. and *Eucheuma denticulatum.*

11.3 Higher salt (as KCl) content

The presence in the sample unit of salt (as KCl) of more than 25% for *Kappaphycus* spp. and 20% for *Eucheuma denticulatum.*

Annex A
(Normative)

Determination of Moisture

A1 Method A – Determine moisture of seaweed by direct reading using the digital moisture analyzer.

A2 Method B – Oven Drying

A2.1 Apparatus: Thermally controlled drying oven

A2.2 Procedure:

a) Weigh one hundred grams of seaweed laboratory sample in a pre-weighed moisture dish. Record weight as W_o;

b) Dry dish plus sample to constant mass at a temperature of 60°C-80°C for *Eucheuma denticulatum* and *Kappaphycus* spp. in maximum of 12 hours; and

c) Calculate Percent Moisture using the following formula:

$$\text{Percent Moisture} = \frac{W_o - W_f}{W_o} \times 100$$

where:

W_f weight of the seaweed after drying
W_o weight of the seaweed before drying

Annex B
(Normative)

Determination of Impurities/Debris

B1 Method: Gravimetric Method

B1.1 Apparatus:

Analytical Balance
Triple Beam Balance
Weight Boat
Raw Material (raw seaweeds)

B1.2 Procedure:

a) Weigh one (1) kg laboratory seaweed sample. Record weight as W_o;

b) Remove debris and other foreign material by hand.

c) Weigh the impurities/ debris and other foreign materials. Record weight as WD; and

d) Calculate Percent Impurities/Debris by the formula:

$$\% \text{ Impurities/debris} = \frac{WD}{W_o} \times 100$$

where:

WD is the mass of debris/impurities and other foreign materials in grams

W_o is the mass of laboratory sample taken for analysis in gram

Annex C
(Normative)

Determination of Salt and Sand

I. Salt as KCl

C1 Method: Mohr's Method

C1.1 Apparatus:

Top Loading Balance	2-L beaker
Stirring rod	1-L Volumetric flask
50, 10 mL pipettes	250 mL Volumetric Flask
250 mL Erlenmeyer flask	50 mL burette
Burette clamp	Medicine dropper

C1.2 Reagents:

Potassium chromate	0.1 M $AgNO_3$

C1.3 Procedure:

a) Get a one (1) kg representative sample of the seaweed raw material;

b) Weigh 250 gram into a 2-L beaker;

c) Add about 900 mL of distilled water, soak the seaweed overnight to remove the sand and salt. Remove the seaweed, stir the solution very well to completely dissolve the salt;

d) Decant the solution into a 1-L volumetric flask and dilute to volume distilled water. Save the sand for further analysis;

e) Mix the solution well and measure a 50 mL aliquot into a 250-mL volumetric flask;

f) Dilute to volume with distilled water. Mix well and measure a 10 mL aliquot into an Erlenmeyer flask;

g) Add 5 drops of K2CrO4 and titrate with standard 0.100 N AgNO3 to end point (tinge of orange brown);

h) Calculate % salt (as KCl) using the following formula:

$$\% \text{ salt (as KCl)} = \frac{V_{AgNO_3} \times N_{AgNO_3} \times \frac{}{1000} \times 100}{250 \times \frac{50}{1000} \times \frac{10}{250}}$$

II. Sand

C2 Method: Gravimetric Method

C2.1 Apparatus:

Beaker
Porcelain crucible
Oven
Top Loading Balance

C2.2 Procedure:

a) Wash the sand from step C1.3-d with distilled water three (3) times;

b) Put the sand into a pre-weighed porcelain crucible;

c) Dry in the oven at 105°C to constant mass. Record weight as Wd; and

d) Calculate % sand using the following formula:

$$\% \text{ sand} = \frac{Wd}{250} \times 100$$

where:

Wd is the weight of the dried sand in gram

Annex D
(Normative)

Method of Sampling

D1. Sample size

The size of the sample (n) which is the number of bags or bales to be taken from a lot depends on the size of the lot (N) and should be in accordance with Table D.1.

Table D.1 – Sampling plan for seaweed

Lot size (N)	Size of the sample (n)
One (1) to Five (5) bags or bales	All bags or bales
Six (6) to 49 bags or bales	10% bags or bales
50 to 199 bags or bales	10% of the bags or bales
200 bags or bales or more	10% of bags or bales

D2. Sampling procedure

The sample should be taken at random from the lot and to achieve this, a random number table agreed upon between the buyer and seller should be used. If such table is not available, the following procedure should be adopted:

a) Starting from any bag or bale, count the bags/bales as one (1), two (2), three (3)… etc. up to r and so on. Withdraw from the lot every rth bag or bale thus counted for sampling, the value of r is equal to

$$r = \frac{N}{n}$$

where:

N is the total number of bags or bales in the lot;
n is the number of bags or bales to be taken (see Table D.1)

b) If r is a fractional number, its value should be taken as equal to the integral part of it.

D2.1 When the product is in movement, samples may be taken at the time of loading or unloading of the bags or bales. For this purpose, the number of bags or bales to be taken should also be in accordance with Table D.1. The value of r should be calculated as indicated above, and every rth bags or bales counted during loading or unloading should be removed for sampling.

D2.2 Take primary samples, by means of an appropriate sampling instrument, from different parts of each bags or bales selected.

D2.3 A series of primary samples should be taken from different positions in the lot.

D3 Bulk sample

D3.1 Thoroughly mix all the primary samples taken as described above to form the bulk sample.

D3.2 The size of the bulk sample should be more than three (3) times the quantity of sample required to carry out all the tests required in the specification.

D4 Laboratory samples

D4.1 Divide the bulk sample into three (3) or more equal parts. Each part thus obtained constitutes a laboratory sample; one (1) of these samples is intended for the buyer and another for the seller. The third sample, bearing the seals of the buyer and of the seller (or of their representatives) if they were present at the time of sampling or of the person who sampled the lot, should constitute the reference sample to be used in case of dispute between buyer and seller; it should be kept at a place acceptable to both parties.

D4.2 Samples for test should be one (1) kilogram.

Bibliography

Braune, W. (2011). Seaweeds: A colour guide to common benthic green, brown and red algae of the world's oceans. Koeltz Botanical Books. https://koeltz.com/en/seaweeds-a-colour-guide-to-commonbenthic-green-brown-and-red-algae-of-the-worlds-oceans-translated-andrevised-for-the-english-language-edition-by-michael-d-guiry-20111020-figs-on-263-col-plates-601-p-

Bureau of Agriculture and Fisheries Standards (BAFS) – Department of Agriculture (DA). (2021). Philippine National Standard (PNS) on the Code of Good Aquaculture Practices (GAqP) for seaweeds (PNS/BAFS 208:2021). http://www.bafs.da.gov.ph/databases

Bureau of Fisheries and Aquatic Resources (BFAR) – Department of Agriculture (DA). (2014). Regulations on the collection, harvesting, gathering, selling and exporting of Sargassum spp. (Fisheries Administrative Order [FAO] 250-2). https://www.bfar.da.gov.ph/files/img/photos/FAO250-2.pdf

Codex Alimentarius Commission (CAC). (2010). General standard for the labelling of prepackaged foods (CXS 1-1985). http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FStandards%252FCXS%2B1-1985%252FCXS_001e.pdf

Codex Alimentarius Commission (CAC). (2010). Guidelines on the application of general principles of food hygiene to the control of pathogenic Vibrio species in seafood (CAC/GL 73-2010). http://www.fao.org/fao-who-codexalimentarius/codex-texts/guidelines/en/

Codex Alimentarius Commission (CAC). (2012). Guidelines on the application of general principles of food hygiene to the control of viruses in food (CAC/GL 79-2012). http://www.fao.org/fao-who-codexalimentarius/codex-texts/guidelines/en/

Codex Alimentarius Commission (CAC). (2018). Codex Committee on Food Import and Export Inspection and Certification Systems (CCFICCS) (CX/FICS 18/24/7). http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-733-24%252FWorking%2BDocuments%252Ffc24_07e.pdf+

Codex Alimentarius Commission (CAC). (2019). Code of practice for fish and fishery products (CAC/RCP 52-2003 Rev. 12). http://www.fao.org/input/download/standards/10273/CXP_052e.pdf

Codex Alimentarius Commission (CAC). (2020). Recommended International Code

of Practice (RICP) - General principles of food hygiene (CAC/RCP 1–1969 Rev. 4). https://www.loex.de/files/downloads/lebensmittel/Codex%20Alimentarius%20(EN).pdf

Food and Drug Administration (FDA) - Department of Health (DOH). (2014). Rules and regulations governing the labeling of prepackaged food products distributed in the Philippines (FDA Regulation No. 2014-0030). https://www.fda.gov.ph/administrative-order-no-2014-0030-a/

Republic of the Philippines. (1976). The Code on Sanitation of the Philippines (Presidential Decree No. 856). https://doh.gov.ph/sites/default/files/publications/code_on_sanitation_phils.pdf

Department of Agriculture (DA)
Bureau of Agriculture and Fisheries Standards (BAFS)

Technical Working Group (TWG) for the Amendment of Philippine National Standard (PNS) on Raw Dried Seaweeds– Product Standard

Chairperson
Alfredo Pedrosa III
Seaweed Industry Association of the Philippines (SIAP) Inc.

Vice Chairperson
Demosthenes Togonon
Bureau of Fisheries and Aquatic Resources (BFAR)- DA

Members

1 Charmaine Buitre
2 Cherry Romero
3 Irma Ortiz
4 Maria Abegail Albaladejo
5 Marlon Alejandro
6 Niño Carlo Isnit
BFAR-DA

7 Dinna Lacsamana-Umengan
Philippine Council for Agriculture and Fisheries (PCAF)- DA

8 Una Grace Dullete
Industrial Technology Development Institute - Department of Science and Technology (ITDI - DOST)

9 Michael Roleda, Ph.D.
University of the Philippines Marine Science Institute (UP MSI)

10 Anicia Hurtado, Ph.D.
11 Maria Rovilla Luhan, Ph.D.
Integrated Services for the Development of Fisheries and Aquaculture, Inc. (ISDA, Inc.)

BAFS Management Team
Karen Kristine Roscom
Camille Baraquiel
Froline Bernas

Adviser
Myer Mula, Ph.D.
BAFS-DA

BUREAU OF AGRICULTURE AND FISHERIES STANDARDS

BPI Compound Visayas Avenue, Diliman, Quezon City 1101 Philippines
T/ (632) 928-8741 to 64 loc. 3301-3319
E-mail: bafs@da.gov.ph
Website: www.bafs.da.gov.ph