



GRAINS - GRADING & CLASSIFICATION - PADDY & MILLED RICE

PNS/BAFS 290:2019

ILLUSTRATIVE GUIDE



Grains – Grading and classification –
Paddy and milled rice
(PNS/BAFS 290:2019)

Bureau of Agriculture and Fisheries Standards (BAFS)
Quezon City, 2021



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Published by:

Bureau of Agriculture and Fisheries Standards

BAFS Building, BPI Compound, Visayas Avenue, Diliman, Quezon City

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ISBN 978-621-455-227-6 (PDF)

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Director's Message



Rice has always been a staple in Filipino households. Every Pinoy, I suppose, eats rice at least three times a day. Traders and millers, however, have shared with the Department of Agriculture that locally-produced rice in the country has lesser quality compared to imported rice.

It is high time for us to equip our Filipino farmers with the right information to produce better, if not the best, rice in the world.

With this, we are thrilled to share with you this Illustrative Guide (IG), which will serve as a supplementary learning material of the Philippine National Standards for Grains - Grading and classification - Paddy and milled rice (PNS/BAFS 290:2019).

The Guide was likewise drafted to contribute to the One DA Reform Agenda achieving its goal of a "food-secure and resilient Philippines with empowered and prosperous farmers" through improved rice competitiveness.

I would also like to thank and congratulate Dr. Myer G. Mula, the former BAFS Director, who gave invaluable technical guidance on the initial stages of the development of the document.

The Bureau is optimistic that this document will help the Philippine rice industry in ensuring the quality of rice for the domestic market and, hopefully, in enabling the country to export more.

To our Filipino rice farmers, padayon!


VIVENCIO R. MAMARIL, PhD
Director IV
Bureau of Agriculture
and Fisheries Standards

Assistant Director's Message



The role that rice plays in the lives of Filipinos is not only apparent on the percentage of population consuming it or on the volume of consumption; it is actually where our Filipino traditions are anchored on. This shows how important this commodity is to us.

Our current rice needs are supplied by local production and also by imported rice. With the influx of rice supply coming from various sources, BAFS issues this Illustrative Guide for Paddy and Milled Rice Classification to educate the

consuming public on what should be expected for Premium as opposed to Grade No. 5 milled rice, and to aid farmers on the grade requirements for paddy rice.

Hopefully, the consumers can make informed decisions and our farmers harvest economic gains from the knowledge obtained through this Illustrative Guide.

Mary Grace R. Mandigma
MARY GRACE R. MANDIGMA

Assistant Director
Bureau of Agriculture
and Fisheries Standards

Introductory Note

For years, the Department of Agriculture – Bureau of Agriculture and Fisheries Standards (BAFS) developed Philippine National Standards (PNS), i.e. end-product quality standards, codes of practices, and guidelines, for agriculture and fishery products including agri-fishery machineries, tools and equipment. As of December 2021, DA-BAFS has developed a total number of 316 PNS for agriculture and fishery (AF) products, tools, machinery, equipment, and structures.

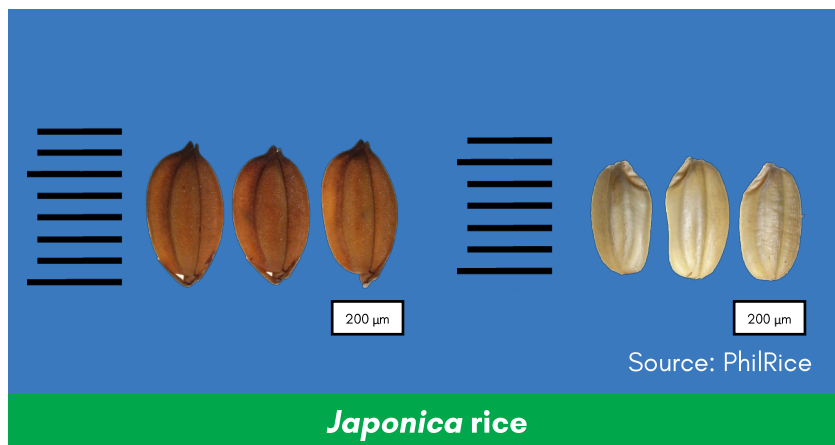
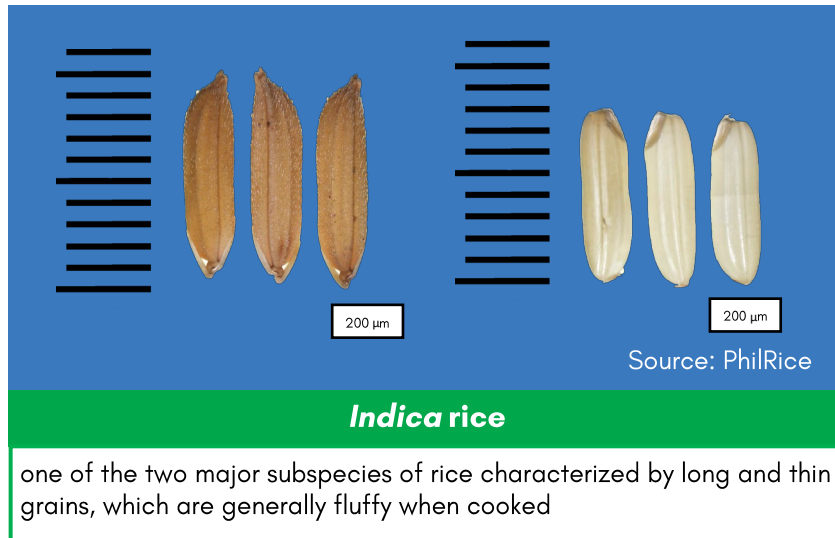
Disseminating information on adopted standards was identified as one of the strategies to encourage stakeholders' usage and implementation. In order to do this effectively, the standards developed need to be translated into knowledge products that will be easily understood by the intended stakeholders. One of the KPs is the Illustrative Guide. IG serves as supplementary PNS learning material aside from the usual learning and development activities conducted by the Bureau, i.e. seminars, workshops and trainings. Through this IG, it is envisioned that stakeholders will have uniform understanding and interpretation of the PNS for its efficient adoption and implementation.

Rice is the major staple food in Filipino households and one of the major Philippine agricultural commodities. These, therefore, emphasize the need for safe and high-quality rice and rice products for Filipinos. In view of this, the Bureau initiated the development of Illustrative Guide for PNS/BAFS 290:2019 Grains – Grading and classification – Paddy and milled rice. The IG for Rice Grains provides supplementary photographs or images pertaining to some provisions of the end-product quality standard for rice grains. The photographs/images included in the document were either taken by the TSD Project Manager through the assistance of the National Food Authority, obtained from the internet, or provided by the Technical Working Group (TWG) members from the government institutions and private sector. To ensure that the IG is technically accurate, a series of TWG meetings were conducted.

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This standard covers the recommended product specifications, packaging and labeling of *Indica*-type paddy and milled rice to be sold in the local and international market. It is neither applicable to other products derived from rice, nor to special rice.



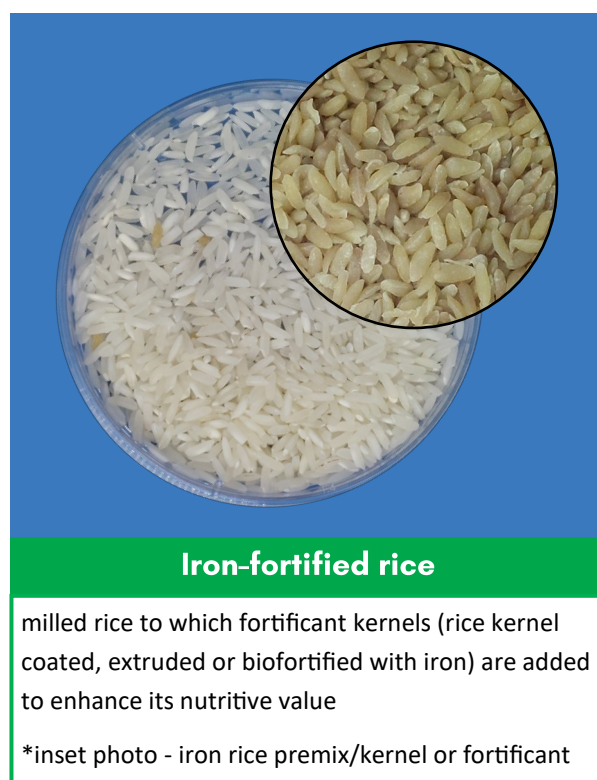
Terms and definitions

Rice variety

specific name given to a rice (*Oryza sativa*) line that results from genetic improvement and approved for commercial release by a national agency or traditional rice that has been selected a long time ago but has not undergone formal seed system

Special Rice

rice variety (traditional or modern) possessing any special quality such as glutinous, aromatic, pigmented, japonica, and micronutrient-dense rice. It includes those varieties with excellent eating and nutritive quality



Grain

paddy and milled rice which can also be alternatively called kernel

Germ (embryo)

small portion which lies on the ventral side of the rice kernel from where the seed germinates

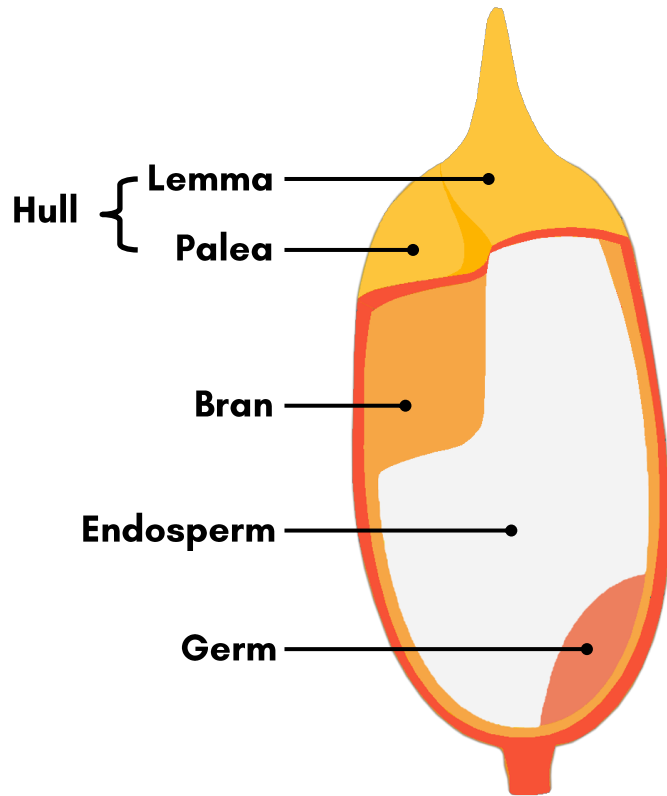
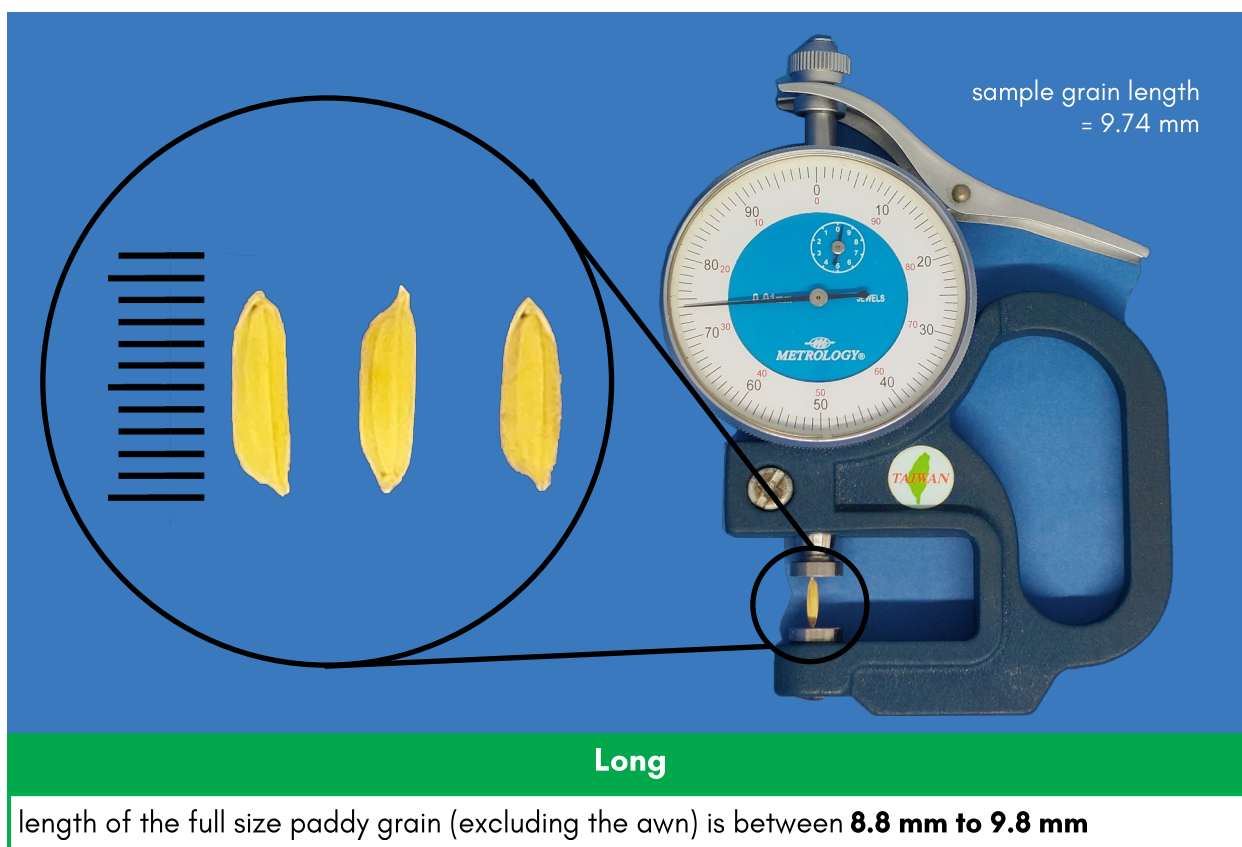
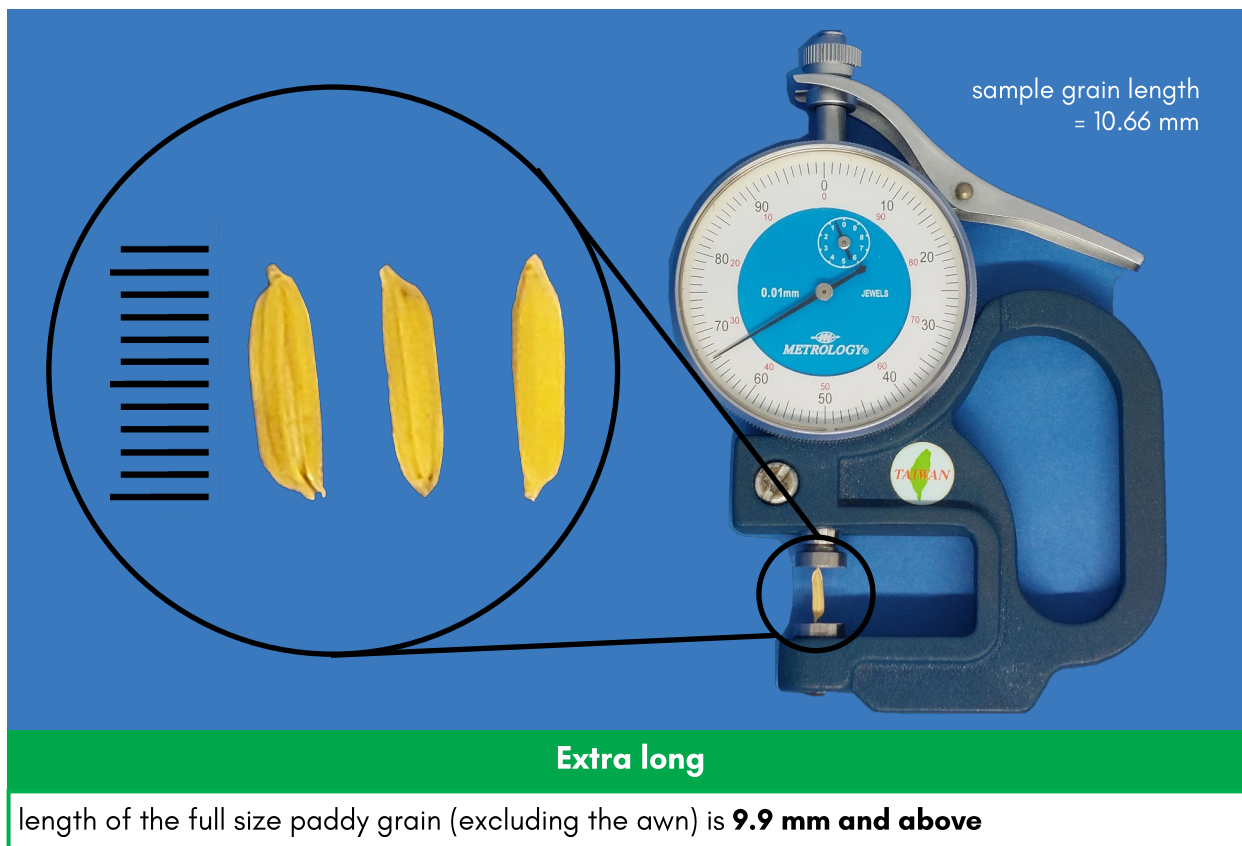


Figure 1. Parts of a rice grain



Grain size (grain length)

category of at least 80 % of the sample of paddy or whole milled rice kernels to which the sample belongs and is measured in millimeters

Grain sizes for paddy

sample grain length = 8.37mm

Medium

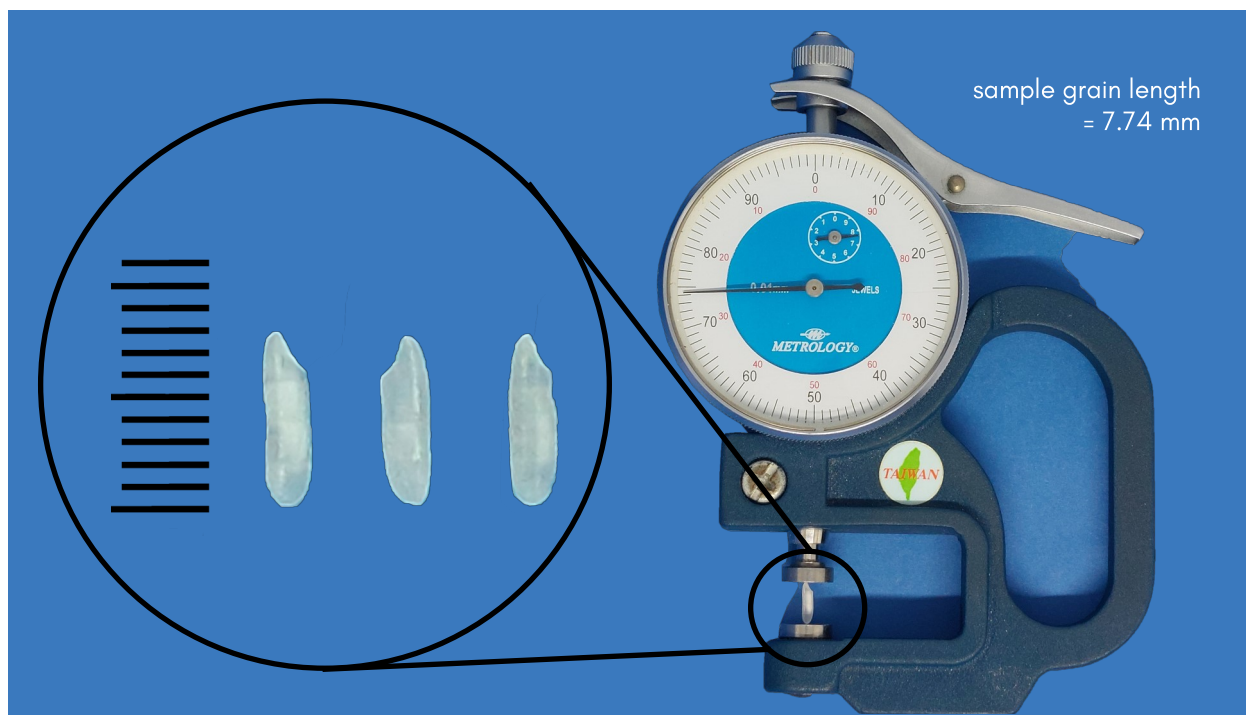
length of the full size paddy grain (excluding the awn) is between **8.0 mm to 8.7 mm**

sample grain length = 7.98mm

Short

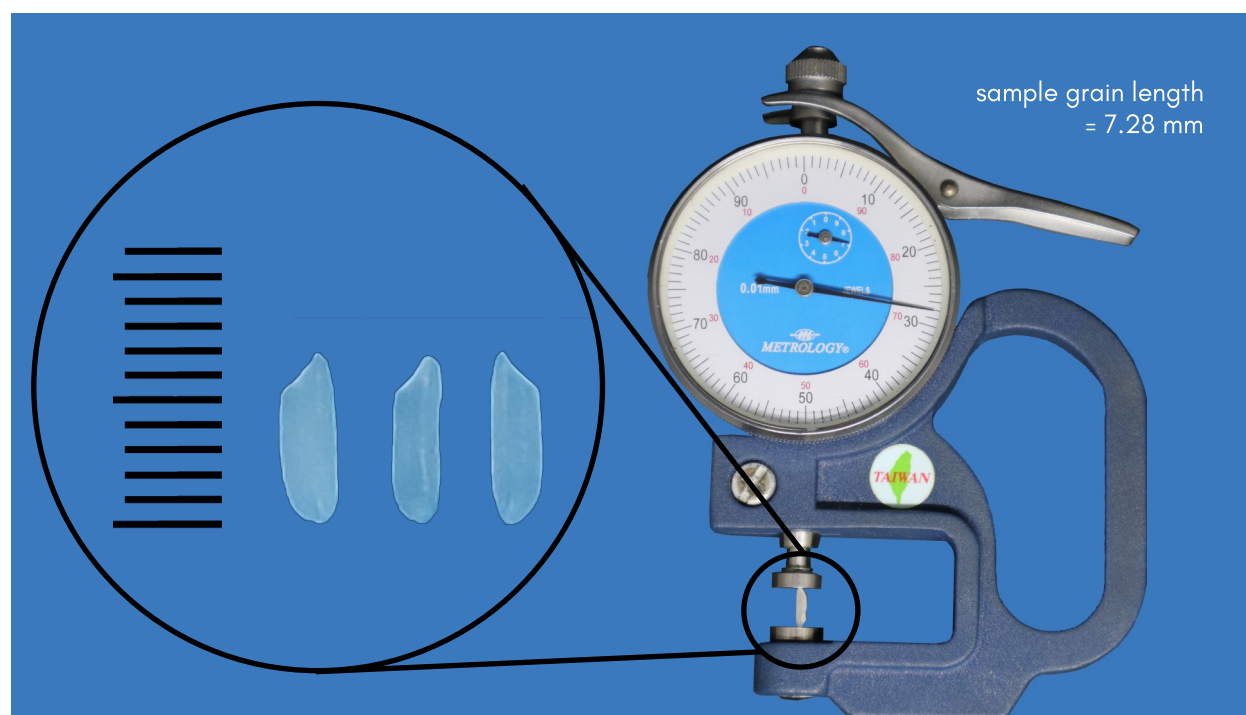
length of the full size paddy grain (excluding the awn) is **below 8.0 mm**

Grain sizes for milled rice



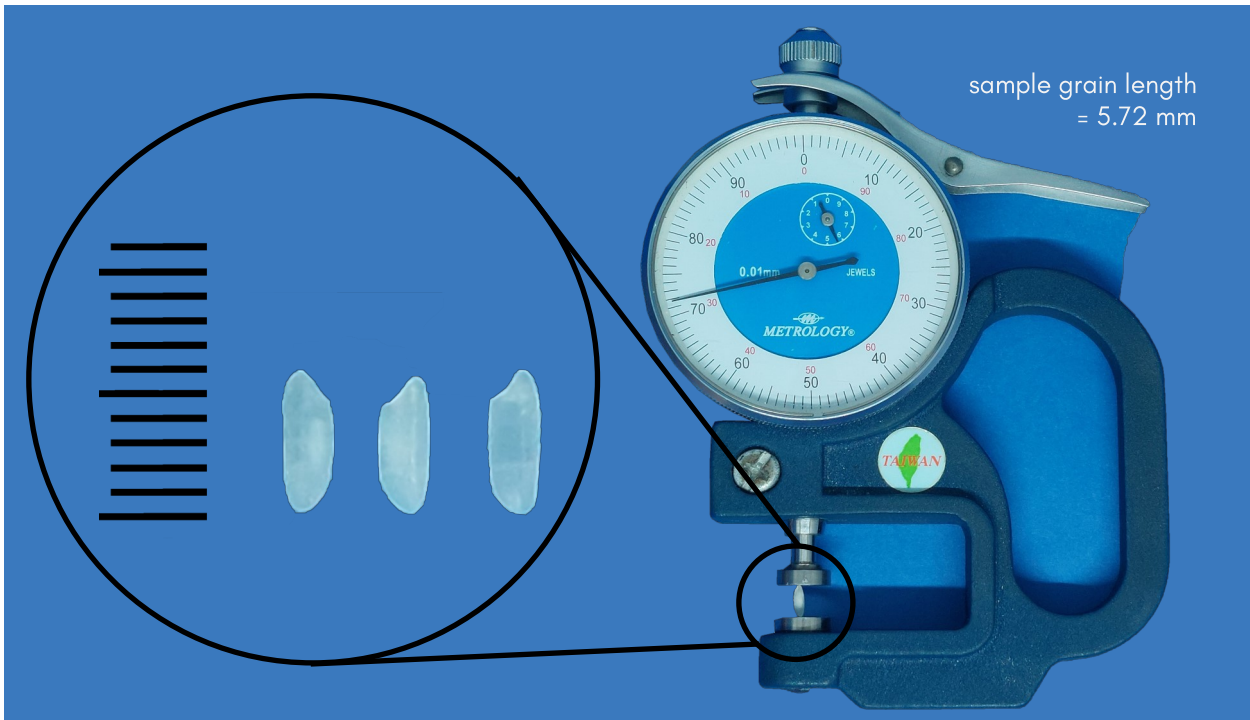
Extra long

rice with 80 % or more of the whole milled rice kernels having a length equal to **7.5 mm and above**



Long

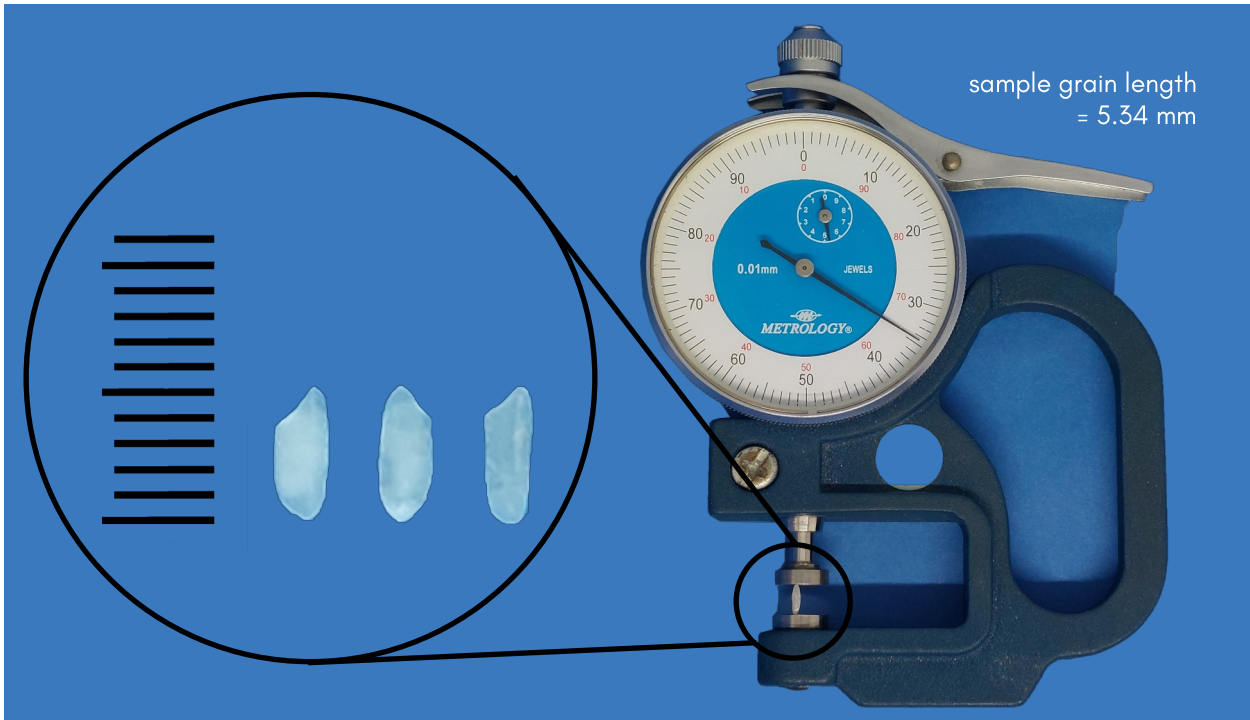
rice with 80 % or more of the whole milled rice kernels having a length equal to **6.4 mm to 7.4 mm**



sample grain length = 5.72 mm

Medium

rice with 80 % or more of the whole milled rice kernels having a length of **5.5 mm to 6.3 mm**



sample grain length = 5.34 mm

Short

rice with 80 % or more of the whole milled rice kernels having a length of less than **5.5 mm**

Degree of milling

extent to which the bran layers have been removed in hulled rice

**Undermilled rice (UMR)**

rice kernel from which the hull, germ, outer bran layer, and the greater part of the inner bran layers have been removed but parts of the lengthwise streaks (in the dorsal portion) of the bran layers remain in more than 40 % of the kernels

**Regular milled rice (RMR)**

rice kernel from which the hull, the germ, the outer bran layers and the greater part of the inner bran layers have been removed but parts of the lengthwise streaks of the bran layers remain in 20 % to 40 % of the kernels

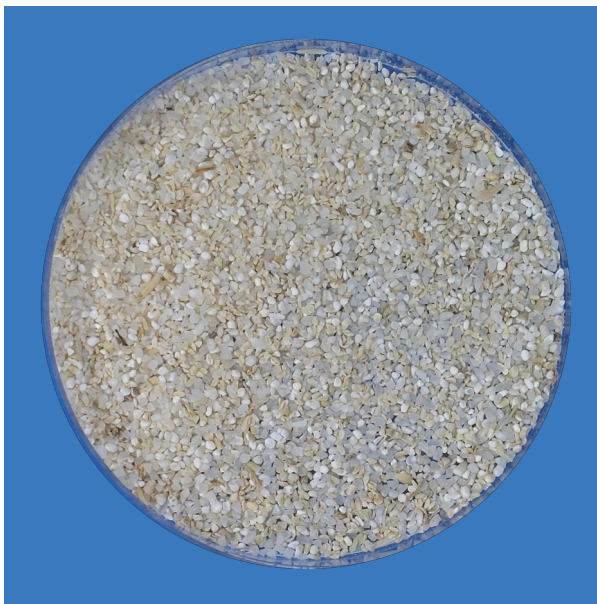
**Well milled rice (WMR)**

rice kernels from which the hull, the germ, the outer bran layers and the greater part of the inner bran layers have been removed, but parts of the lengthwise streaks of the bran layers remain in less than 20 % of the kernels

**Overmilled rice (OMR)**

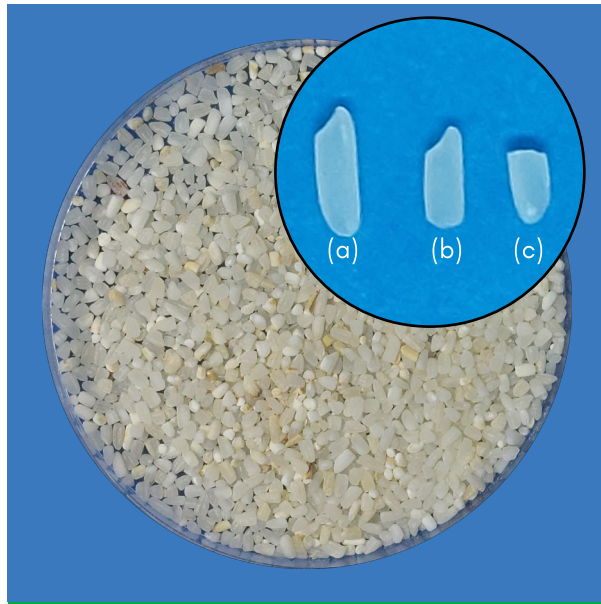
rice kernel from which the hull, the germ, the bran layers, and part of the endosperm have been removed

The following are the **defects or damages** observed in **milled rice**:



Brewers

(chips; binlid)
small pieces of kernels that pass through a sieve having 1.4 mm round perforation



Broken kernels

(brokens)
pieces of kernels smaller than 75% of the average length of the whole kernel

*inset photo: sample length (a) whole kernel = 7.43 mm, (b) head rice = 5.65 mm, and (c) broken kernel = 3.92 mm



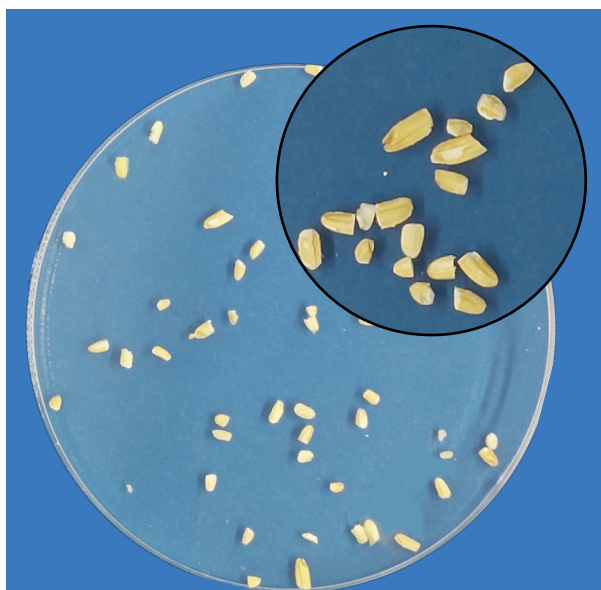
Chalky kernels

kernels, whole or broken, 50 % or more of which is similar to the color of white chalk



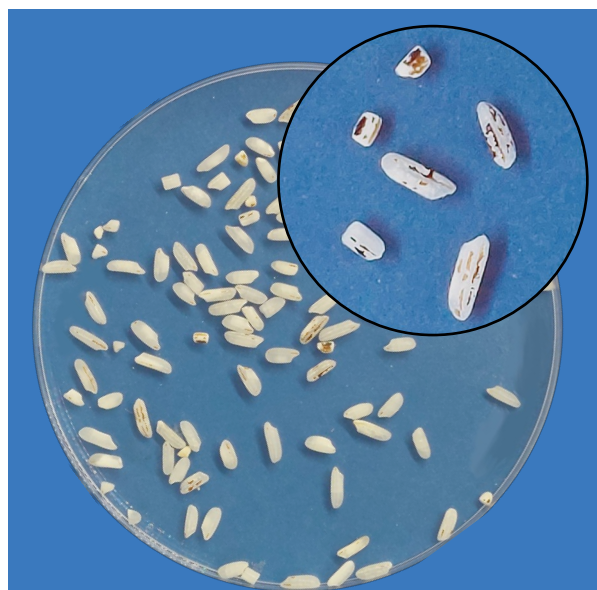
Discolored kernels

(yellow kernel; fermented kernels)
kernels that have changed their original color as a result of heating and other means



Immature kernels

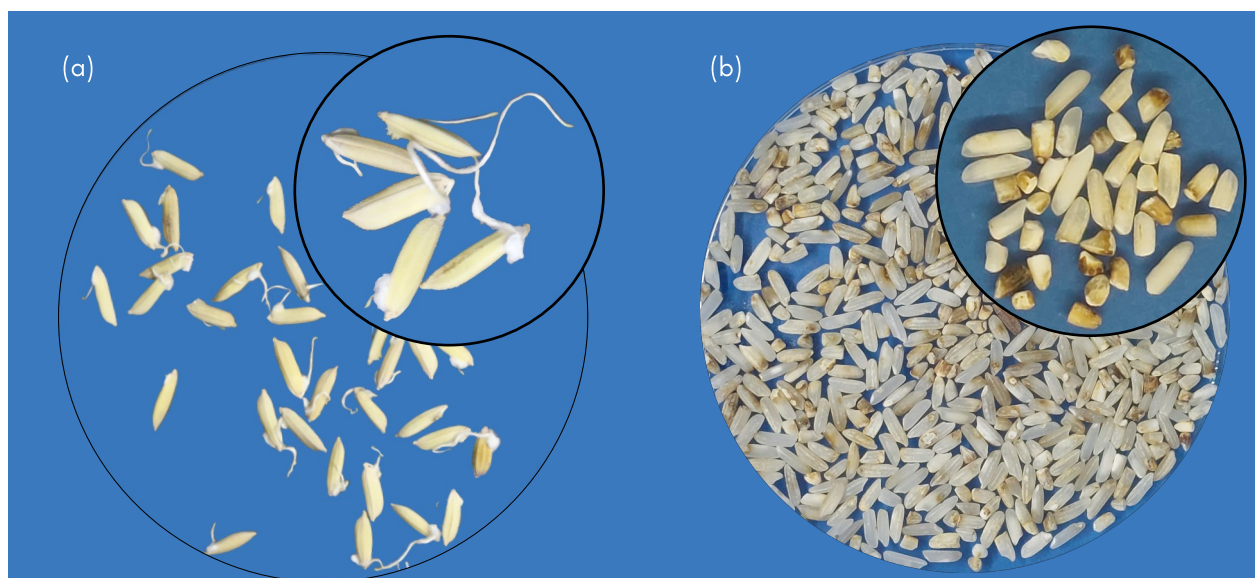
head rice or broken kernels which are light green and chalky with soft texture



Red kernels

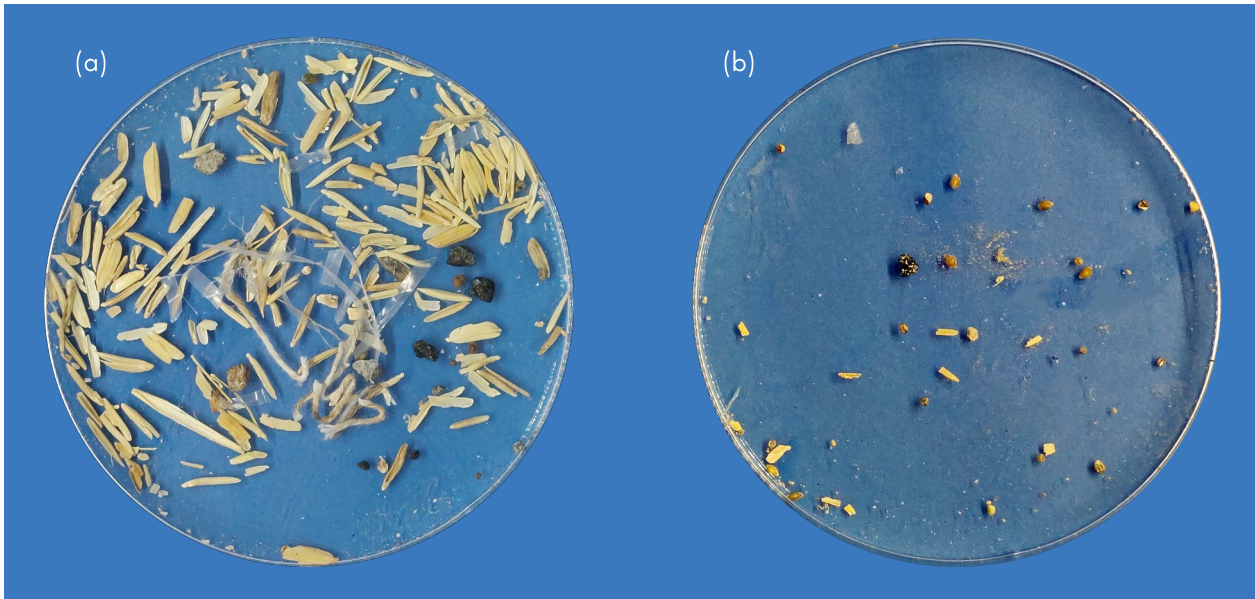
kernels that have red bran covering, wholly or partly

The following are the **defects or damages** observed in **paddy/milled rice**:



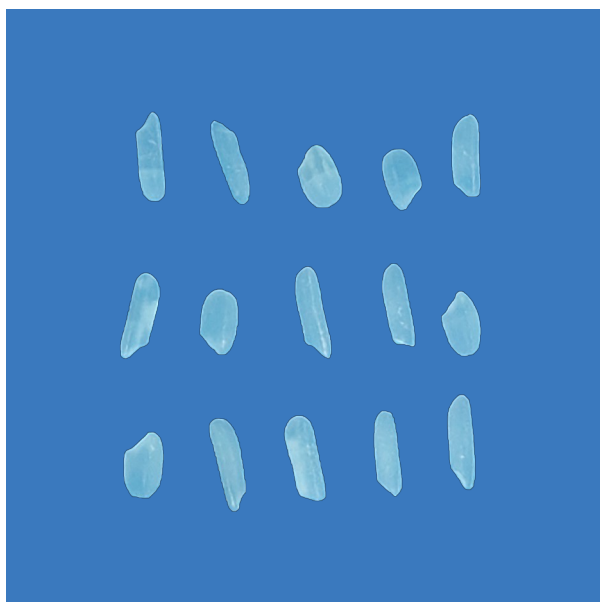
Damaged kernels

(a) paddy - kernels which have germinated, distinctly damaged by insects, microorganisms, water, heat and/or any other means; **(b) milled rice** - kernels which are obviously damaged by insects, water, diseases and/ or any other means seen by the naked eye



Foreign matter

(a) for paddy, all matters other than paddy grains such as chaff, straw, other crop seeds, sand, gravel, dirt, pebbles, stones, lumps of earth, clay, and mud; **(b) for milled rice**, all matters other than whole or broken rice kernels such as foreign seeds, husks, bran and sand, dust



Contrasting type

paddy/rice kernels of different varieties other than the variety designated, wherein the size, shape, and color differ distinctly from the characteristics of kernels of the variety designated



Weed seeds and other crop seeds

seeds of any plant other than rice

Other terms used in the document are the following:

Amylose

type of starch with glucose molecules having a straight-chain, or linear, structure. Its percentage determines the tenderness or firmness of cooked rice and its staling property when left unattended at room temperature *Note: indicator of eating quality

Distributor (importer/exporter)

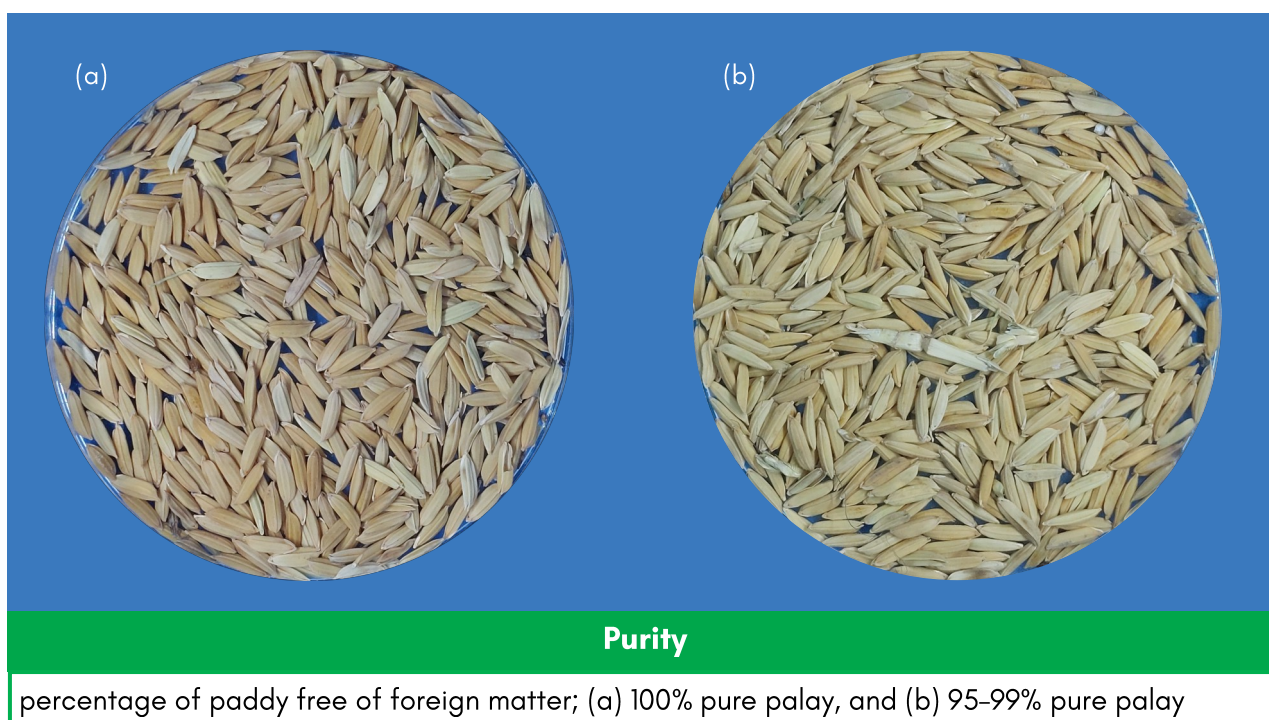
any establishment that imports or exports raw materials, active ingredients and/or finished product for its own use or for whole sale distribution to other establishments or outlets. If the distributor/importer/exporter sells to the general public, it should be considered as a retailer.

Gelatinization temperature

range of temperature within which starch granules start to swell irreversibly in hot water with accompanied loss of birefringence and crystallinity *Note: estimates cooking time

Glycemic index

physiological classification of dietary carbohydrates based on the blood glucose response from a food relative to the standard glucose solution or starchy food



Grade

designation indicating the degree of quality of paddy (up to grade 3) or milled rice (up to grade 5)

Table 1. Grading classification for paddy and milled rice

Grade	Description
Premium Grade	meets the highest grade requirements as set forth in the herein prescribed national standards
Grade No. 1	meets the second highest grade requirements for rice as set forth in the herein prescribed national standards
Grade No. 2	lower in quality than grade no. 1 but higher in quality than grade no. 3, based on the grade requirements for rice as set forth in the herein prescribed national standards
Grade No. 3	lower in quality than grade no. 2 but higher in quality than grade no.4 based on grade requirements for milled rice as set forth in the herein prescribed national standards. Any paddy variety which meets the lowest grade requirements for paddy as set forth in the herein prescribed national standards
Grade No. 4	lower in quality than grade no. 3 but higher in quality than grade no.5 based on the grade requirements for milled rice as set forth in the herein prescribed national standards
Grade No. 5	meets the lowest grade requirement for milled rice as set forth in the herein prescribed national standards

These parameters are further defined in terms of intrinsic or acquired characteristics of paddy and milled rice as summarized in Tables 1 and 2.

3.1 Paddy should be classified as extra long, long, medium, or short according to grain size.

3.2 Paddy should conform with the grade requirements specified in Table 2

Table 2. Grade requirements for paddy rice

Parameter	Grade			
	Premium	Grade no. 1	Grade no. 2	Grade no. 3
Grade factors (% by weight)				
Purity, min.	98.00	95.00	90.00	85.00
Total foreign matter, max.	2.00	5.00	10.00	15.00
(a) Weed seeds and other crop seeds, max.	0.10	0.15	0.25	0.50
(b) Other foreign matters, max.	1.90	4.85	9.75	14.50
Defectives				
Chalky and immature kernels, max.	3.00	6.00	12.00	20.00
Damaged kernels, max.	0.50	1.50	3.00	5.00
Discolored kernels, max.	0.50	2.00	4.00	8.00
Contrasting types, max.	3.00	6.00	10.00	18.00
Red kernels, max.	1.00	3.00	5.00	10.00

3.2.1 Paddy which exceeds the maximum limit or falls short of the minimum requirements for any grade factor or parameter of a given grade shall be given the next lower grade.

3.2.2 Paddy which does not meet the requirements for any of the grades shall be graded as **Off-Grade Paddy**.

3.2.3 The maximum percentage of (a) weed seeds and other crop seeds shall not be exceeded but the maximum percentage of (b) other foreign matter may be exceeded provided that the maximum percentage of total foreign matter is not exceeded.

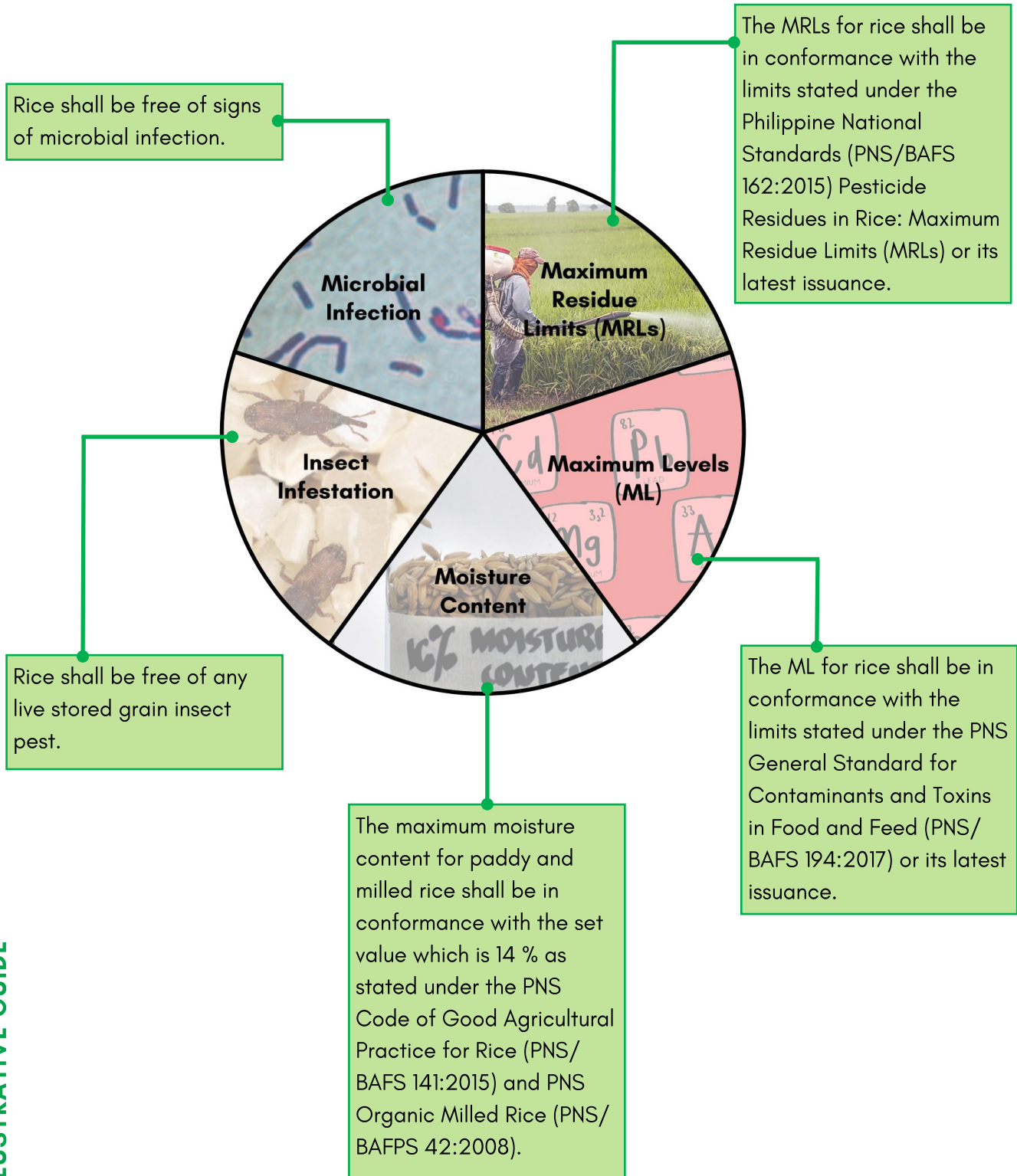
- 4.1 Milled rice should be classified as extra long, long, medium, or short according to grain size.
- 4.2 Milled rice shall be classified as overmilled rice, well milled rice, regular milled rice, or undermilled rice according to degree of milling.
- 4.3 Milled rice shall conform with the grade requirements specified in Table 3.

Table 3. Grade requirements for milled rice

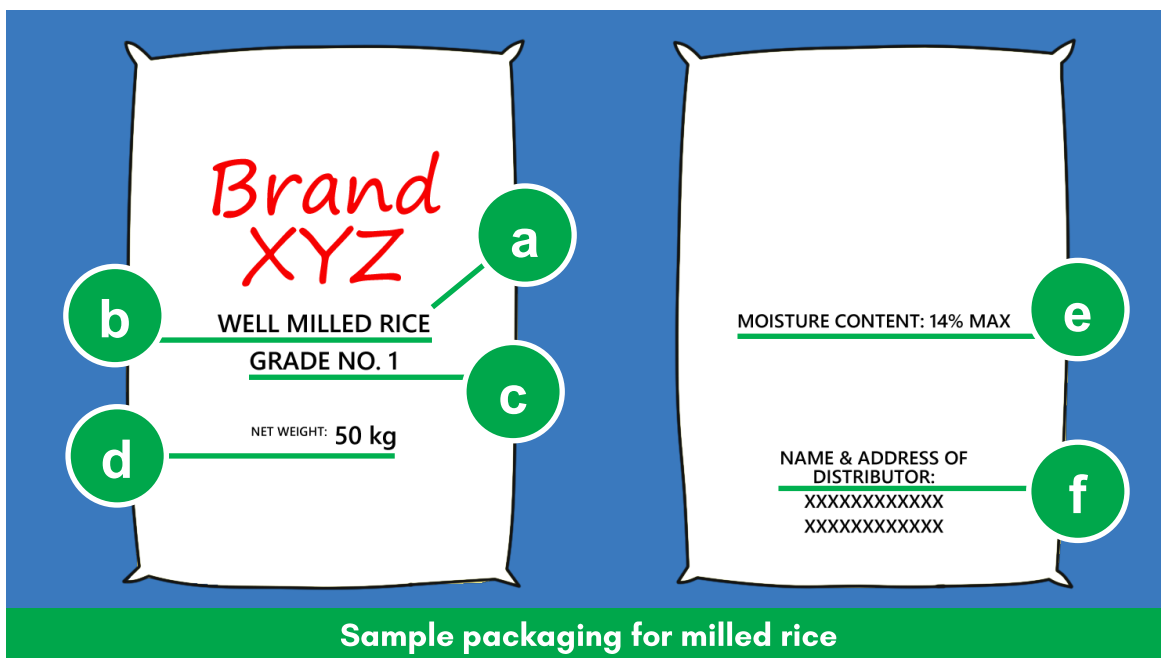
Parameter	Grade					
	Premium	Grade no. 1	Grade no. 2	Grade no. 3	Grade no. 4	Grade no. 5
Grade factors (% by weight)						
Broken kernels,	5.00	10.00	15.00	25.00	35.00	45.00
Brewers, max. (total including brewers)	0.10	0.20	0.40	0.60	1.00	2.00
Defectives						
Damaged kernel, max.	0.50	0.70	1.00	1.50	2.00	3.00
Discolored kernel, max.	0.50	0.70	1.00	3.00	5.00	8.00
Chalky kernel, max.	4.00	5.00	7.00	9.00	12.00	15.00
Immature kernel, max.	0.20	0.30	0.50	1.00	1.50	2.00
Contrasting type, max.	3.00	5.00	10.00	10.00	10.00	10.00
Red kernel, max.	1.00	2.00	4.00	5.00	6.00	7.00
Foreign matters, max.	0.025	0.10	0.15	0.17	0.20	0.25
Paddy, max. (no. per 1,000 grams)	5	10	15	20	25	25

- 4.3.1 Milled rice which exceeds the maximum limit or falls short of the minimum grade requirement for any grade factor or parameter of a given grade shall be given the next lower grade.
- 4.3.2 Milled rice which does not meet the requirement for any of the grades shall be graded as **Off-Grade Rice**.
- 4.3.3 The maximum percentage of brokens may be exceeded provided that the maximum percentage of brewers is not exceeded.
- 4.3.4 Milled rice which contains 50 % or more red grains shall be graded according to the grade requirements in Table 2 and the word Red Kernel shall be added as part of the grade designation.

These parameters are further defined in terms of Maximum Residue Limits (MRLs) for pesticides, maximum level (ML) for contaminants (heavy metals), moisture content, presence of insect infestation, and microbial infection.



- 6.1 Dried paddy shall be packed in clean and appropriate packaging material in accordance with the PNS Code of Good Agricultural Practice for Rice. Packaging materials previously used for feeds and other chemically contaminated containers shall not be used.
- 6.2 Packaging materials to be used for milled rice shall be brand new and food-grade. Suitable food grade ink shall be used for printing or labeling on the packaging material.
- 6.3 The minimum requirements for labelling of milled rice shall be:
- Name of product (e.g., milled rice) if the contents are not visible from the outside;
 - Grade of milled rice;
 - Degree of milling;
 - Net weight;
 - Moisture content, in percent; and
 - Name and address of distributor.



Type of packaging material for milled rice



Woven propylene or WPP



Polyethylene



Source: Packaging Depot Manila

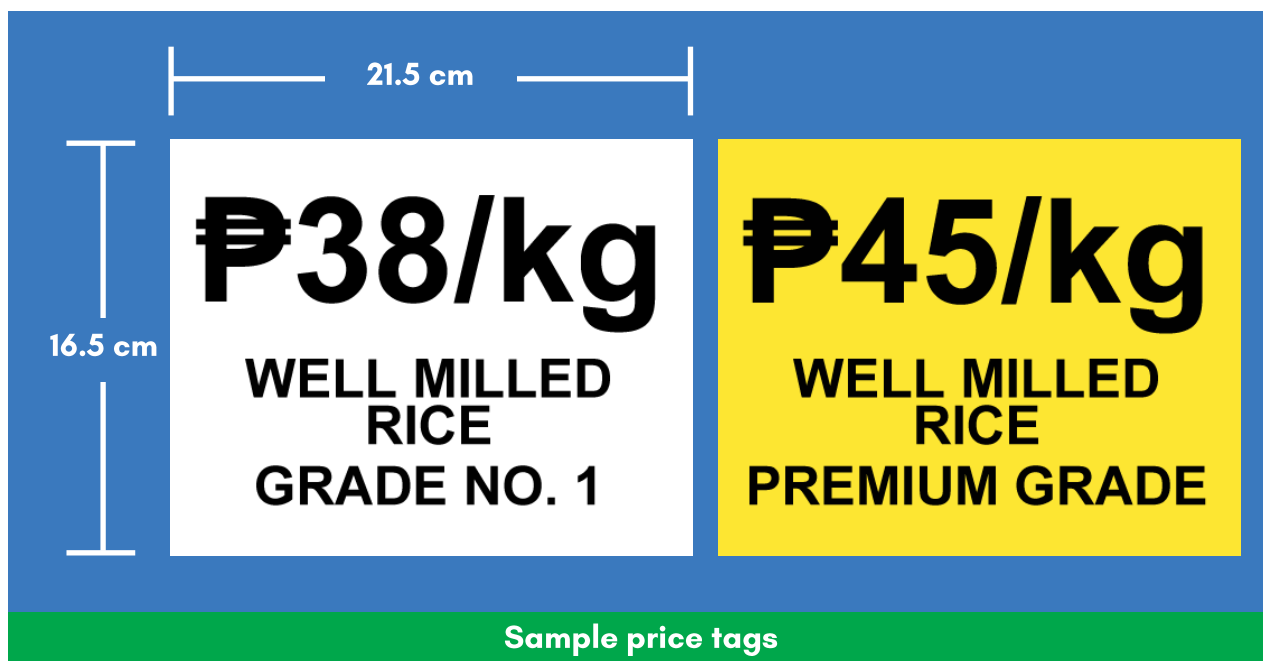
Kraft paper

The price tag to be used in retailing unpacked rice shall be in accordance with the standard requirement set under Table 4.

Table 4. Standard requirement for price tag in unpacked rice for retail

Particulars	Standard requirement
A. Size of price tag (length by width)	21.5 cm x 16.5 cm
B. Color of price tag	
• Premium grade rice	Light yellow
• Well milled rice Grade nos. 1, 2, 3, 4, or 5	White
• Regular milled rice Grade nos. 1, 2, 3, 4, or 5	White
C. Color of print on price tag	Black
D. Prescribed information	Price per kilogram (P/kg) Classification Iron-fortified rice Grade

- 7.1 Unpacked milled rice for retail shall be displayed in wooden rice boxes painted on the outside with food-grade white paint or fiberglass rice boxes which shall be free of posters/ advertisements. The white painted wooden rice boxes shall be covered (at the end of business hours) to ensure that the rice will not be exposed to pests and other contaminants that may cause harm to the consumers. The prescribed color-coded price tag shall be conspicuously displayed on the grains box.
- 7.2 The required information shall be printed in bold letter and figures (except the unit symbol “kg” for the unit name “kilogram/s”) on the color-coded price tag.



Methods of test and analysis

The methods of test and analysis for rice should conform with the procedures of the competent authority.

Hygiene

It is recommended that the products covered by the provisions of this Standard be prepared and handled in accordance with the PNS Good Warehousing Practices for Bagged Grains (PNS/BAFS 193:2017).



Figure 2. PNS/BAFS 193:2017
Good Warehousing Practices for
Bagged Grains

DOCUMENT REFERENCES

Bureau of Agriculture and Fisheries Standards (2019). PNS/BAFPS 290:2019 – Grains – Grading and classification – Paddy and milled rice.

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ISBN 978-1-78280-808-4

