

PHILIPPINE NATIONAL STANDARD

**PNS/BAFS 13:2024
ICS 67.080.01**

Mangoes — Product Standard — Grading and Classification



BUREAU OF AGRICULTURE AND FISHERIES STANDARDS

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Foreword

The previous PNS on Mangoes -Specification (BAFPS/PNS 13:2004) was approved in 2004. In 2018, the DA-BAFS Technical Services Division (TSD) conducted a series of Field Data Gathering (FDG) for the development of knowledge products to promote the PNS on Mangoes-Specification. The FDG aimed to provide guidelines and graphic illustrations to aid in the interpretation and implementation of the PNS on Mangoes-Specification, particularly on its grading and classification systems. The results of the FDG showed that some of the requirements stipulated in the existing PNS were not complied with since they were no longer reflective of the recent scientific data and farming practices. Further, the DA-BAFS Standards Development Division (SDD) conducted a harmonization assessment for PNS/BAFS 13:2004 (Fresh Fruit — Mangoes — Specification) against ASEAN Stan 2-2006 rev. 1-2012 (ASEAN Standard for Mango) in 2021. The harmonization assessment aimed to determine the degree of alignment of the technical requirements in the national standard against the regional standard. Results of the harmonization assessment showed that the PNS/BAFPS 13:2004 was only 46% harmonized with ASEAN Stan 2-2006 rev. 1-2012. This further established the need to amend and update the technical requirements of the PNS on Mangoes-Specifications to align with the ASEAN standard and current trade requirements. Thus, the amendment of the PNS on Mangoes-Specification was included in the DA-BAFS SDD work priorities for CY 2024.

A Technical Working Group (TWG) was established through the following Special Orders (SO) to assist in the amendment of PNS Mangoes — Product Standard — Grading and Classification:

- a. SO No. 1314, series of 2023 (Addendum to SO No. 146, series of 2023 [Creation of the TWG for the development of PNS for agricultural and fishery products, machinery, and infrastructures]); and
- b. SO No. 305, series of 2024 (Creation of TWG and Project Management Team [PMT] for the Development of PNS for Agricultural and Fishery Products and Machinery).

The TWG was composed of representatives from the relevant government agencies, academe/research institutions, private sector organizations, and Civil Society Organizations (CSO).

The Standard includes the following significant changes compared to its previous version:

1. Alignment of classification, provisions concerning quality, tolerances, presentation, marking or labeling, food additives, contaminants, hygiene, and methods of analysis and sampling with the applicable regional and international standard; and
2. Inclusion of nutritional composition of mangoes.

This Standard cancels and replaces PNS/BAFPS 13:2004, which has been technically amended. This document was drafted in accordance with the editorial rules of the DA-BAFS-SDD Standardization Guide No. 1: Writing the PNS.

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1 Scope

This Standard applies to commercial varieties of mangoes grown from *Mangifera indica* L. of the Anacardiaceae family to be supplied fresh to the consumer, after postharvest handling and packaging. Mangoes for industrial processing are excluded. The provisions of this Standard covers food safety and quality requirements and nutritional composition of mangoes.

2 Normative References

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

Association of Southeast Asian Nations (ASEAN). (1995). ASEAN principles for food import and export inspection and certification
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3 Terms and Definitions

For the purpose of this Standard, the following definitions apply:

3.1 damage

any specific defect or an equally objectionable variation of defects or a combination of defects, which materially detracts from the appearance, edibility, utility or shipping quality of the produce (CAC, 2022). Damage may be caused by physical means, insects, pests and unfavorable environmental factors such as heat, wind, hail and frost (CAC, 2022)

3.2 fresh

appearance of fruit and vegetables displaying the characteristics of recently harvested produce (i.e., color, texture, firmness, turgescence), including absence of shriveling, wilting or signs of senescence (United Nations Economic Commission for Europe [UNECE], 2016)

3.3**Maximum Level (ML)**

maximum concentration of a substance recommended by the CAC to be legally permitted in that commodity (CAC, 2019)

3.4**Maximum Residue Limits (MRL)**

maximum concentration of a pesticide residue (expressed as mg/kg) to be legally permitted in or on food commodities and animal feeds. MRL are based on GAP data and foods derived from commodities that comply with the respective MRL are intended to be toxicologically acceptable (CAC, 2019)

3.5**sound**

free from physical injury, decay, and the presence of live or dead insects including insect eggs and larvae affecting its appearance, eating and/or keeping quality, and market value (CAC, 2022)

3.6**sunburn**

discoloration of the surface of fresh fruits and vegetables (FFV) due to direct exposure to sun's rays. Depending on the FFV, the affected area may be thickened, tough or leathery with underlying discolored flesh (CAC, 2022)

4 Provisions Concerning Quality**4.1 Minimum requirements**

In all classes, subject to the special provisions for each class and the tolerances allowed, the mangoes shall be:

- a) whole;
- b) firm;
- c) fresh in appearance;
- d) sound, excluding produce affected by rotting or deterioration such as to make it unfit for consumption;
- e) clean, practically free of any visible foreign matter;
- f) free of damage caused by pests affecting the flesh;
- g) free of abnormal external moisture excluding condensation following removal from cold storage;
- h) free of any foreign smell and/or taste;
- i) free of necrotic stains or trails; and
- j) free of marked bruising.

When a peduncle is present, it shall not be longer than 1 cm.

4.2 Minimum maturity requirements

4.2.1 The mangoes shall have reached an appropriate degree of development and/or maturity in accordance with criteria proper to the variety and/or commercial type and to the area in which they are grown. The ‘Carabao’ mango should be harvested at a minimum of 115 days after flower induction (DAFI) (del Mundo, et al., 1984).

4.2.2 The degree of development and condition of the mangoes shall be such as to enable them to:

- a) withstand transportation and handling; and
- b) arrive in a satisfactory condition at the place of destination.

4.2.3 In relation to the stages of ripeness, the color may vary according to the variety. The stages of ripeness of ‘Carabao’ and ‘Pico’ varieties are shown in Annex A (Stages of ripeness of ‘Carabao’ and ‘Pico’ mango fruits).

5 Classification

Mangoes can be classified into three classes defined below:

5.1 “Extra” Class

Mangoes in this class shall be of superior quality. They shall be characteristic of the variety and/or commercial type. They shall be practically free of defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

5.2 Class I

Mangoes in this class shall be of good quality. They shall be characteristic of the variety and/or commercial type. The following defects, however, may be allowed, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package:

- a) slight defects in shape; and
- b) slight skin defects. The maximum skin defect due to rubbing or sunburn, suberized stains due to resin (latex) exudation (elongated trails included) and healed bruises are shown in Table 1.

Table 1. Maximum area of skin defects in mangoes for Class I

Size Code	Maximum area of skin defects
1	5 cm ²
2	4 cm ²

Size Code	Maximum area of skin defects
3	3 cm ²
4	not exceeding 2 cm ²
5	not exceeding 2 cm ²

The defects shall not, in any case, affect the flesh of the fruit.

5.3 Class II

This class includes mangoes that do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified in Clause 4. The following, however, may be allowed, provided the mangoes retain their essential characteristics as regards to the quality, the keeping quality and presentation:

- a) defects in shape; and
- c) skin defects. The maximum skin defects due to rubbing or sunburn, suberized stains due to resin (latex) exudation (elongated trails included) and healed bruises are shown in Table 2.

Table 2. Maximum area of skin defects in mangoes for Class II

Size Code	Maximum area of skin defects
1	7 cm ²
2	6 cm ²
3	5 cm ²
4	not exceeding 4 cm ²
5	not exceeding 4 cm ²

The defects shall not, in any case, affect the flesh of the fruit. In Classes I and II, scattered suberized rusty lenticels, as well as sunburn due to exposure to direct sunlight, not exceeding 40 percent of the surface and not showing any signs of necrosis are allowed.

6 Provisions Concerning Sizing

- 6.1** Mangoes may be sized by weight or in accordance with existing trade practices. When sized in accordance with existing trade practices, the package shall be labeled with the size and method used.
- 6.2** When sized by weight, size is determined based on the individual weight of each mango or a weight range per package. Table 3 is a guide for size classification of mangoes and may be used on an optional basis.

Table 3. Size classification for mangoes based on weight (BAFS-DA, 2024)

Size Code	'Carabao' (g)	'Pico' (g)
1	>350	>300
2	>300-350	>250-300
3	>250-300	>200-250
4	>200-250	>150-200
5	150-200	100-150

7 Provisions Concerning Tolerances

At all marketing stages, tolerances with respect to quality and size shall be allowed in each lot for produce not satisfying the requirements of the class indicated. Conformity assessment for the produce should be conducted in accordance with the relevant provisions in the PNS/BAFS 293:2020 (Principles and guidelines for national food control systems), ASEAN Principles for food import and export inspection and certification, (CAC/GL 20-1995) Principles for food import and export inspection and certification, and/or the CXG 47-2003 (Guidelines for food import control systems).

7.1 Quality tolerances

7.1.1 "Extra" class

Five percent (5%) by number or weight of mangoes not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

7.1.2 Class I

Ten percent (10%) by number or weight of mangoes not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class.

7.1.3 Class II

Ten percent (10%) by number or weight of mangoes not satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

7.2 Size tolerances

For all classes, 10% by number or weight of mangoes not satisfying the requirements as regards to sizing but falling within the size immediately above

or below those indicated in Clause 6. Maximum permissible difference between fruit in each package exceeding the normal size range shall be 50 g.

8 Provisions Concerning Presentation

8.1 Uniformity

The contents of each package (or lot for produce presented in bulk) shall be uniform and contain only mangoes of the same origin, quality, and size. The visible part of the contents of the package (or lot for produce presented in bulk) shall be representative of the entire contents.

8.2 Packaging

8.2.1 Mangoes shall be packed in such a way to protect the produce properly. The materials used inside the package shall be food grade, clean, and of quality to avoid any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications is allowed, provided that the printing or labeling has been done with non-toxic ink and/or glue.

8.2.2 Mangoes shall be packed in each container in conformance with the PNS/BAFS 198:2017 (Code of practice for packaging and transport of fresh fruits and vegetables). Packages (or lot for produce presented in bulk) shall be free of all foreign matter and smell.

9 Provisions Concerning Marking or Labeling

9.1 Consumer packages

In addition to the requirements of the CXS 1-1985, Rev. 1-2018 (General standard for the labelling of prepackaged foods) or its latest issuance, the following specific provisions shall apply:

9.1.1 Name of produce

Each shall be labeled as to the name of the produce and may be labeled as the name of the variety and/or commercial type.

9.1.2 Origin of produce

Country of origin and, optionally, district where grown, or national, regional or local place name.

9.1.3 Date marking (Optional)

It refers to the date of harvest or packaging of mangoes.

9.2 Non-retail containers

The marking or labeling of non-retail containers should be in accordance with the CXS 346-2021 (General standard for the labeling of non-retail containers of foods). In addition, each package shall bear the following information particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside:

9.2.1 Origin of produce

Country of origin and, optionally, district where grown or national, regional or local place name.

9.2.2 Commercial specifications

- a) Class; and
- b) Size (if sized).

9.2.3 Date marking (Optional)

It refers to the date of harvest or packaging of mangoes.

9.2.4 Official control mark (optional)

10 Food Additives

Food additives listed in Tables 1 and 2 of the CXS 192-1995 (General standard for food additives) under Food Category 04.1.1.2 (Surface-treated fresh fruits) may be used in mangoes conforming to this Standard.

11 Contaminants

11.1 Mangoes shall comply with the MRL of pesticides of the PNS/BAFS 160:2021 (Mango — Product Standard — MRL of pesticides), CAC, and/or ASEAN Harmonized MRL of Pesticides or their latest issuances.

11.2 Mangoes shall comply with the ML of the CXS 193-1995, Rev. 2019 (GSCTFF) and/or PNS 194:2022 (GSCTFF — Product standard) or their latest issuances.

12 Hygiene

- 12.1** The produce covered by the provisions of this Standard should be prepared and handled in accordance with the appropriate sections of the ASEAN GAP, ASEAN General Principle for Food Hygiene, CXS 1-1969 (RICP — General principles of food hygiene), PNS/BAFS 49:2021 (GAP for fresh fruits and vegetable farming), PNS/BAFS 45:2009 (Code of GAP for Mango), PNS/BAFS 233:2018 (COHP for fresh fruits and vegetables), and other relevant codes of practice.
- 12.2** The produce shall comply with microbiological criteria established in accordance with the PNS/BAFS 307:2020 (Establishment and application of microbiological criteria related to food) and PNS/BAFS 372:2023 (Primary and postharvest food and feed — Product standard — Microbiological criteria)

13 Methods of Analysis and Sampling

Analytical and sampling methods to be used for ascertaining conformance to the requirements of this specification shall be in accordance with the relevant text in PNS ISO 874:2011 (Fresh fruits and vegetables — Sampling) and CXS 234-1999 (Methods of analysis and sampling) or their latest issuances.

14 Nutritional Composition

Information on the nutritional composition is shown in Annex B (Nutritional composition of mangoes) based on the Philippine Food Composition Table of 2019.

Annex A
(Informative)

Stages of ripeness of ‘Carabao’ and ‘Pico’ mango fruits

Stages of ripeness	Peel color	Flesh color
Green	Completely light green	Yellowish white or light-yellow green
Breaker	Traces of yellow	Middle area and fruit outline yellowish; other areas, white to yellowish white
Turning	More green than yellow	More yellow than white
Semi-ripe	More yellow than green	Yellow for ‘Carabao’ and yellow orange for ‘Pico’
Ripe	80-100% yellow (‘Carabao’) and yellow orange (‘Pico’)	Middle area yellow for ‘Carabao’ and yellow orange for ‘Pico’

Annex B
(Informative)

Nutritional composition of mangoes
(DOST-FNRI, 2019)

Nutrients	Value		
Proximate			
	Ripe	Medium Ripe	Unripe
Water (g)	82.4	83.6	84.0
Energy, calculated (kcal)	70	66	63
Protein (g)	0.6	0.4	0.5
Total Fat (g)	0.2	0.4	0.2
Carbohydrate, total (g)	16.4	15.2	14.9
Ash, total (g)	0.4	0.4	0.4
Other Carbohydrates			
Fiber, total dietary (g)	1.7	1.6	1.5
Sugars, total (g)	13.8	9.4	5.7
Minerals			
Calcium, Ca (mg)	10	10	34
Phosphorus, P (mg)	19	10	20
Iron, Fe (mg)	0.6	0.6	0.3
Sodium, Na (mg)	4	14	6
Vitamins			
Retinol, Vitamin A (µg)	0	0	0
beta-Carotene (µg)	1165	130	80
Retinol Activity Equivalent, RAE (µg)	97	11	7
Thiamin, Vitamin B1 (mg)	0.09	0.06	0.08
Riboflavin, Vitamin B2 (mg)	0.07	0.02	0.04
Niacin (mg)	0.8	0.03	0.2
Ascorbic Acid, Vitamin C (mg)	46	49	70
Lipids			
Fatty acids, saturated, total (g)	0.05	0.10	0.05
Fatty acids, monounsaturated, total	0.07	0.15	0.07

Nutrients	Value		
(g)			
Fatty acids, polyunsaturated, total(g)	0.04	0.07	0.04
Cholesterol (mg)	0	0	0
NOTE The values indicated were computed per 100g of edible portion of mangoes.			

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Bureau of Agriculture and Fisheries Standards (BAFS)

**Philippine National Standard (PNS) on Mangoes — Product Standard —
Grading and Classification**

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