# PHILIPPINE NATIONAL STANDARD

PNS/BAFPS 57:2007
ICS 065.020.20

**Fresh fruits – Mandarin – Grading and classification**

BUREAU OF PRODUCT STANDARDS

## Foreword

The Philippine National Standard for Mandarin (PNS/BAFPS 57:2007**)** was formulated by Bureau of Agriculture and Fisheries Product Standards (BAFPS) in order to reflect the recent technology developments in the industry and the need for harmonization with Codex requirements in Heavy Metals, Pesticide Residues and Hygiene.

A Technical Committee (TC) and Sub-Committee organized by Bureau of Agriculture and Fisheries Product Standards (BAFPS) through Special Order No. 411. series of 2001 and Special Order No. 169, series of 2007 to identify members and experts that shall be involved in the formulation of PNS for Mandarin.

The draft standard for Mandarin was presented to the Technical Committee and Sub-Committee for technical reviews and public consultations held in three major islands of the country.

PNS/BAFPS.57:2007 covered the scope, definition of terms, common mandarins, minimum requirements, classification, sizing, tolerances, packaging, marking and labeling, contaminants and hygiene.

# Fresh fruits – Mandarin – Grading and classification

## 1 Scope

This standard establishes a system of grading and classifying commercial varieties of citrus fruits, mandarin grown from *Citrus reticula* Blanco of the Rutaceae family or known as dalanghita produced in the Philippines to be supplied fresh to the consumer. Mandarin for industrial processing are excluded.

## 2 References

The titles of the standards publications and other references of this standard are listed on the inside back cover.

## 3 Definitions

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

**3.1**
**clean**
the fruit is free from dirt and other foreign matter

**3.2**
**damage**
any defect or injury which affects to varying degrees the appearance, eating and shipping qualities of mandarins

**3.2.1**
**discoloration**
is caused by rust mite which occurs as light-colored spots spread over more than half the surface of the fruit affecting more than 12 percent of the surface in the aggregate, or occurrence of dark –colored spots affecting more than 6 percent of the surface in the aggregate

**3.2.2**
**dryness or mushy condition**
affecting all segments more than 6.4 mm at stem-end and in other portions of the fruit

**3.2.3**
**insect damage**
injury/damage caused by insect

**3.2.4**
**scars or blemishes**
when the skin is smooth and light-colored affecting more than 5 percent of the surface in aggregate; or when the skin is rough or caked or discolored affecting an aggregate area exceeding that of a circle 1 cm in diameter

**3.2.5**
**sunburn**
any change in color of the skin due to direct exposure to sunlight

**3.3**
**diameter**
the widest circumference of the fruit (equatorial)

**3.4**
**firm**
the fruit is not soft or flabby

**3.5**
**mature**
mandarins have reached the stage of development which will insure proper completion of the ripening process. The fruits have glossy appearance of the skin and a color change from dark green color of immature fruit to lighter green color often tinged with yellow. The flesh is yellow

**3.6**
**serious damage**
damage caused by freezing or drying due to any condition if 20 % or more of the pulp or edible portion of the fruit shows evidence of drying, dessication or a mushy condition

**3.7**
**similar varietal characteristics**
the fruits in any container are similar in color and shape

**3.8**
**well-formed**
the fruit has good symmetry and has typical shape of the variety

**3.9**
**well-trimmed**
the stem has been neatly removed from the fruit without injury to the skin; or has been cut off neatly to within 5 mm of the fruit

## 4 Common mandarins

**4.1 Szinkom –** Fruits are small, weighs about 86 g; oblate; yellowish orange when ripe; has characteristic aroma, and the flavor is pleasantly sweet; subacid; has tendency to dry up when over ripe; seeds are short and plump and has 16 seeds per fruit.

**4.2 Ladu** – Fruits are medium, weighs about 117 g; oblate; bright orange; juicy even when thoroughly ripe; and has an average seeds of 21 per fruit.

**4.3 Ponkan –** Fruits have excellent quality; roundish to slightly oblong in shape; rind is medium to thick and slightly pebbled.

**4.4 Satsuma –** Fruits have delicate flesh, sweet, usually seedless, smaller in size than an orange, has distinctive thin, leathery skin dotted with large and prominent oil glands lightly attached around the fruit.

**4.5 Szibat** – This cultivar is derived from a cross between Szinkom and Batangas mandarin; similar to szinkom in productivity and characteristics, but has better fruit quality.

**4.6 King** – Fruits are largest among the mandarins; oblate to round in shape; has thick, smooth to rough rind which adheres to the fruit moderately.

**4.7 Gayunan** – A native of Kalinga, similar to Ladu.

## 5 Minimum requirements

In all classes subject to the special provisions for each class and tolerances allowed, mandarin/dalanghita fruits shall meet the following requirements:

**5.1** Mandarins must be whole; firm; sound; clean; well-formed; well-trimmed; practically free from bruising; free from damage caused by pests affecting the general appearance of the produce; practically free of any foreign matter; free of damage caused by high and/or low temperature; free of abnormal external moisture excluding condensation following removal from cold storage; and free from any foreign smell and/or taste; and satisfy the minimum requirement of maturity (Annex A).

**5.2** Mandarins must be carefully picked and have reached an appropriate degree of development and ripeness in accordance with the criteria proper to the variety and/or commercial type, maturity period or time of picking, and to the area in which they are grown. The development and condition of the mandarins must be such as to enable them to: (a) withstand transport and handling, and (b) arrive in satisfactory condition at the place of destination.

**5.3** Mandarins must be free from signs of external shriveling caused by bruising or extensive healed-over cuts. Internal shriveling can also be caused by over ripeness of the fruits at harvesting, poor cultural management and virus infection.

## 6 Classification

Mandarin is classified into three classes as defined below:

### 6.1 Extra class

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

### 6.2 Class I

Mandarin in this class must be of good quality. They must be characteristic of the variety and/or commercial type. The following slight 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 color, (b) slight defects inherent in the formation of the fruit, and (c) slight skin healed defect due to mechanical causes. The defects must not, in any case affect the pulp of the fruit.

### 6.3 Class II

This class includes mandarin which do not qualify for inclusion in the higher classes but satisfy the minimum requirements specified in Clause 5. The following defects may be allowed, provided the mandarins retain their essential characteristics as regard to quality, the keeping quality and presentation in the package: (a) defects in shape; (b) defects in colouring; and (c) healed skin defects due to mechanical causes. The defects must not, in any case, affect the pulp of the fruit.

## 7 Sizing

Sizing is determined by the maximum diameter of the equatorial section.

| Size | Diameter (in mm) |
|---|---|
| Small | 50 – 60 |
| Mediun | 61 – 71 |
| Large | 72 - 82 |
| Extra Large | > 82 |

## 8 Tolerances

### 8.1 Quality tolerances

**8.1.1 Extra class** – Ten percent by number or weight of mandarins not satisfying the requirements for the class, but conforming to those of Class I or, exceptionally, coming within the tolerances of that class.

**8.1.2 Class I** – Ten percent by number or weight of mandarin fruit not satisfying the requirements for the class, but conforming to those of Class II or, exceptionally, coming within the tolerances of that class.

**8.1.3 Class II** – Ten percent by number or weight of mandarin fruit not satisfying the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any deterioration rendering it unfit for consumption.

### 8.2 Size tolerances

For all classes, ten percent by number or weight of mandarins not corresponding to the size immediately above and/or below that indicated on the package.

## 9 Packaging

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

## 10 Marking and labeling

Each container shall have a label or legible characters grouped on the same side stamped in indelible ink to provide the following information:

**10.1** Name of product, variety or commercial type;

**10.2** Class and size;

**10.3** Net weight (kg);

**10.4** Name of producer, trader and exporter; and

**10.5** Product of the Philippines.

## 11 Contaminants

### 11.1 Heavy metals

Mandarins shall comply with those maximum residue levels for heavy metals established by the Codex Alimentarius Commission and/or authority for this commodity.

### 11.2 Pesticide residues

Mandarins shall comply with those maximum residue limits established by the Codex Alimentarius Commission and/or authority for this commodity.

## 12 Hygiene

**12.1** It is recommended that the produce covered by the provisions of this standard be prepared and handled in accordance with appropriate sections of the Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1 – 1969, Rev. 4 – 2003), Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003), and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

**12.2** The produce should comply with any microbiological criteria established in accordance with the Principles for the Establishment and Application of Microbiological Criteria for Foods (CAC/GL 21-1997).

## Annex A

## Minimum maturity requirement of citrus fruit

| Cultivar | Color index (%) | TSS (%) | TA (%) | TSS:TA | Juice content (ml) |
|---|---|---|---|---|---|
| **Valencia** | 25 | 8.5 | 0.5 | 10:1 | 50 |
| **Ladu** | 25 | 8.0 | 0.6 | 8:1 | 50 |
| **Ponkan** | 50 | 9.5 | 0.5 | 10:1 | 50 |
| **Batangas** | - | 7.5 | 0.7 | 7:1 | 50 |
| **Szinkom** | - | 7.5 | 0.7 | 7:1 | 50 |

**Legend:**

**TSS** - Total soluble solid (%)
**TA** - Titratable acidity (%)

**Source:** Javier, F. B. and R. T. Calendacion. 1995. Citrus Production. College of Agriculture, UP at Los Baños, College, Laguna, Philippines.

The following referenced documents are indispensable for the application 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.

Alexander D. Mc E (Donald McEwan). 1983. Some Citrus Species and Varieties in Australia, Photographs by E. A. Lauton, Division of Horticultural Research, CSIRO Research Organization, Australia.

Barretli H.C. and A. M. Rhodes. 1976. A Numerical Taxonomic Study of Affinity Relationships in Cultivated Citrus and Its Close Relatives. System Botany 1(2): 105 – 136.

Gonzales, C. I., A. D. Toreja and B. Dimayuga. 1984. Citrus. Philippine Science Encyclopedia: Agriculture. National Research Council of the Philippines, Taguig, Metro Manila, 264 p.

Jackson, L. K. and F. S. Davies. 1999. Citrus Growing in Florida. 4th ed. University Press of Florida, Gainesville.

Javier, F. B. and R. T. Calendacion. 1995. Citrus Production. College of Agriculture, UP at Los Baños, College. Laguna, Philippines.

Mukhopadhyay, S. 2004. Citrus: Production, Disease and Pest Management. US Science Publications Inc., Washington, D.C.

Verheij, E. W. M. and R. E. Coronel. 1991. Plant Resources of South-East Asia. No. 2, Edible fruits and nuts. Pudoc Wageningen.

**Department of Agriculture**
**Bureau of Agriculture and Fisheries Product Standards**

**Technical Sub-Committee on Crops**

**Chair**

1 Dr. Elda B. Esguerra
Postharvest Horticulture Training and Research Center, UP Los Baños

**Members**

2 Dr. Leonila M. Varca
National Crop Protection Center,
UP Los Baños

3 Dr. Dario S. Sabularse
Fertilizers and Pesticides Authority
Campus

4 Ms. Juliet Opulencia
Crops Section, National Agriculture
and Fishery Council
Department of Agriculture

5 Ms. Nenita Cabulisan
Crops Research Laboratory
Mariano Marcos State University

6 Mr. Arnulfo Malinis
Bicol University, Pulangui

7 Dr. Anastacia M. Gotiangco
Bureau of Plant Industry

**Expert Involved:**

8 Dr. Rodel G. Maghirang
Institute of Plant Breeding
UP Los Baños

**Secretariat on Crops**

**Chairman**

1 Director Gilberto F. Layese
Bureau of Agriculture and Fisheries Product Standards

**Members**

2. Ms. Angelina A. Bondad
Mr. Clarence F. Agustin
Bureau of Agriculture and Fisheries Product Standards