

PHILIPPINE NATIONAL STANDARD

PNS/BAFPS 65:2008
ICS 67.080.10

Fresh tender coconut or 'Buko'



BUREAU OF PRODUCT STANDARDS

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Foreword

The Philippine National Standard for Fresh Tender Coconut or 'Buko', PNS/BAFPS 65:2008 was developed by the Bureau of Agriculture and Fisheries Product Standards (BAFPS) in order to reflect the recent technology developments in the industry, and the need for its harmonization with Codex requirements in Heavy Metals, Pesticide Residues and Hygiene.

A Technical Committee (TC) and Sub-Committee (SC) were organized by BAFPS through Special Orders No. 411, series of 2001, and No.169, series of 2007 to generate data, formulate the draft standards, attend meetings and public consultations on the PNS for Fresh Tender Coconut or 'Buko' in the three major islands of the country. The standard covers the scope, definitions of terms, minimum requirements, classification, tolerances, sampling, packaging, marking and labeling, contaminants, hygiene, and other considerations.

PNS/BAFPS 65:2008 aims to provide a common understanding on the grading and classifying commercial Fresh Tender Coconut or 'Buko' grown from different varieties and produced in the Philippines to be supplied fresh to the consumers.

1 Scope

This standard establishes a system of grading and classifying commercial fresh tender coconut or 'buko' harvested from *Cocos nucifera* Linn. of the Arecaceae family grown in the Philippines and to be supplied fresh to the consumer, after preparation and packaging.

2 References

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

3 Definitions

3.1

tender coconut or 'buko'

has a smooth rind, harvested at 7 months – 8 months old from spathe opening and which are obtained from a healthy and productive coconut palm tree. At this stage, the soft (meat) and liquid (coconut water) endosperms have reasonably sweet taste and have typical color characteristics of the variety. Under the rind is a 2.5 cm – 5 cm husk of whitish or creamy fibers. The husk and rind surround a brown, woody shell that has three soft spots called "eyes" at one end. The "eyes" in the rind should be kept intact even after removal of the husk. The rind and husk are usually cut before the coconuts are marketed

3.2

tender coconut water (TCW)

known as liquid endosperm obtained from an immature nut (young coconut) which is pure, nutritious and wholesome natural beverage. The water is enclosed with a hard shell which contains approximately 200 ml – 750 ml, sterile and well-lined inside with an 8 mm – 10 mm layer of coconut meat. It is high in ionic nutrients (electrolytes) such as potassium, sodium, calcium, magnesium, chloride, phosphorus and sulfur. It contains 5 % sugars mainly as glucose and fructose, vitamin C which ranges from 2.2 mg/100 mL – 3.7 mg/100 mL, vitamin B group, and amino acids such as glutamic acid, arginine, aspartic acid and leucine. FAO refers Tender Coconut Water as an energy and isotonic drink

3.3

clean

tender coconut is free from dirt and other foreign material

3.4

damage

any crack or defect which materially affects the appearance, eating and shipping qualities of tender coconut

3.5**misshapen**

tender coconut is deformed which materially affects its appearance

4 Minimum requirements

In all classes, subject to the special provisions for each class and the tolerances allowed, the tender coconut or 'Buko' must be:

- harvested 7 months – 8 months old from a healthy coconut palm with the perianth lobe intact to maintain the freshness of tender coconut. This is being practiced by buko drink producers and buko exporters.
- fresh in appearance.
- whole, trimmed or dehusked.
- clean, practically free of any visible foreign matter.
- free of surface defects and cracks at the shell.
- sound, produce affected by rotting or deterioration such as to make it unfit for consumption is excluded.
- preferably free of damage caused by pests.
- preferably free of pests affecting the general appearance of the produce.
- free of abnormal external moisture, excluding condensation following removal from cold storage.
- free of any objectionable smell and/or taste.
- for the whole fruit, spikelet and peduncle should be removed and the calyx should be intact.

The three "eyes" of tender coconut or 'Buko' must be kept intact, undisturbed and unopened when the green and soft skin (exocarp) and husk (mesocarp) are removed. The meat must be firm, white to creamy white and free from undesirable odor/smell and taste.

Consumers have two options to consider in tender coconut or 'Buko': either for tender coconut water (TCW) or for tender coconut meat (TCM) and/or with the TCW. A 6-month old coconut is suitable for TCW and 7 months – 8 months old coconuts are required for TCM. The minimum requirements will depend on the purpose or intended use of the consumers.

The development and condition of the tender coconut or 'Buko' must enable it to:

- withstand transport and handling and
- arrive in satisfactory condition at the place of destination.

5 Varieties of coconut for tender coconut or 'Buko' production as presented in Annexes E and C**6 Classification**

Tender coconut or 'Buko' are classified into three classes, as described below:

6.1 Extra class – Tender coconut or 'Buko' must be of superior quality. It must be the characteristics of the variety and/or commercial type. It must be free of

defects, with the exception of very slight (not exceeding 2 %) superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

6.2 Class 1 – Tender coconut or 'Buko' in this class must be of good quality. It must be the characteristics 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:

- slight defects of shape and color;
- slight defects on the skin/husks/shell excluding cracks due to mechanical damage and blemishes not exceeding 5 % of the total surface area.

The defects must not, in any case, affect the flesh and water of the coconut.

6.3 Class II – This class includes tender coconut or 'Buko' which 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 tender coconut retain their essential characteristics as regards the quality, the keeping quality and presentation in the package:

- defects in shape and color;
- defects on the skin/husks/shell excluding cracks due to mechanical damage and blemishes not exceeding 10 % of the total surface area.

The defects must not, in any case, affect the flesh and water of the coconut.

7 Size classification

Size is determined by the weight of the tender coconut or 'Buko', in accordance with the following table:

7.1 Whole tender coconut

Size code	Weight of tender coconut/'Buko' (g)
W 1	> 2,200
W 2	1,901 – 2,200
W 3	1,401 – 1,900
W 4	901 – 1,400
W 5	400 - 900

7.2 Trimmed tender coconut

Size code	Weight of tender coconut/'Buko' (g)
T 1	> 1,500
T 2	1,201 – 1,500
T 3	901 – 1,200
T 4	601 - 900
T 5	300 - 600

7.3 Dehusked coconut

Size code	Weight of tender coconut/'Buko' (g)
D 1	> 600
D 2	451 - 600
D 3	300 - 450

8 Tolerances

8.1 Quality tolerances

8.1.1 Extra Class – Five (5) percent by number or weight of tender coconut or 'Buko' not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class.

8.1.2 Class 1 – Ten (10) percent by number or weight of tender coconut or 'Buko' not satisfying the requirements of the class but meeting those of Class II or, exceptionally, coming within the tolerances of that class.

8.1.3 Class II – Ten (10) percent by number or weight of tender coconut or 'Buko' 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.

8.2 Size tolerances

For all classes, ten (10) percent by number or weight of tender coconut or 'Buko' corresponding to the size immediately above or below that indicated on the package.

9 Sampling

Sampling method to be used for ascertaining conformance shall be in accordance with PNS/ISO 874.

10 Packaging

Tender Coconut or 'Buko' of the same class shall be packed in suitable container to protect the quality of the produce from any external and internal damage. The containers shall meet the quality, hygiene, ventilation and resistance characteristics to ensure suitable handling and transport of 'Buko'. The containers must be free of all foreign matter and smell.

Tender coconut or 'Buko' shall be packed in each container in compliance with the Recommended International Code of Practice for Packaging and Transport of Fresh Fruits and Vegetables (CAC/RCP 44-1995, Amd. 1-2004).

11 Marking and labeling

Each carton shall be labeled properly with the following information:

- 11.1** Name of produce, variety or commercial type;
- 11.2** Class and size code;
- 11.3** Net content, weight (g)/pieces/pack;
- 11.4** Name and address of grower, trader and/or exporter;
- 11.5** Lot Identification;
- 11.6** Best before;
- 11.7** Province where grown; and
- 11.8** Product of the Philippines.

12 Postharvest treatments

Postharvest treatments such as sodium metabisulfite, ascorbic acid and other anti-oxidants when used as anti-browning agents shall comply with the levels established by the Codex Alimentarius Commission under the provision of the General Standard for Food Additives and/or competent authority for this commodity.

13 Contaminants

13.1 Heavy metals

Tender coconut or 'Buko' shall comply with the maximum levels for heavy metals established by the Codex Alimentarius Commission and/or authority for this commodity.

13.2 Pesticide residues

Tender coconut or 'Buko' shall comply with the maximum residue limits established by the Codex Alimentarius Commission and/or authority for this commodity.

14 Hygiene

14.1 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), and other relevant Codex texts such as Code of Hygienic Practice and Code of Practice.

14.2 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).

15 Other considerations

15.1 Implement Good Agricultural Practices in the production and harvesting of tender coconut or 'Buko'.

15.2 Store tender coconut or 'Buko' in refrigerated van at 13 °C – 16 °C. It must not be exposed to sunlight particularly those nuts for export and can be kept for two (2) weeks.

Annex A

Table 1 – Characteristics of commercial varieties of coconut for 'Buko' production.

Varieties of coconut for 'Buko' production	Wt of nut (g)	Nut circumference (cm)	Wt of meat (g)	Meat thickness (mm)	Firmness (lbs.)	Volume of coconut water (ml)	Total soluble solids (%)	pH of coconut water
Galas green dwarf (GALD)	418	46	137	5.1 – 5.2	2.2	318	7.1 - 7.3	5.9 - 6.6
Tacunan green dwarf (TACD)	326 - 418	56	142 - 159	5.2	2.2	478	7.3	6.6
Coco Niño	104 - 122	38.4	36 - 67	-	-	235 - 242	5.2 – 6.8	4.6 – 4.7
Malayan Yellow Dwarf	108 - 188	37.1	66 - 101	-	-	194 - 315	6.4 - 6.7	5.1 - 6.2
Aromatic Green Dwarf	126 - 144	42.1	66 - 78	-	-	214 - 218	7.4 - 8.4	5.1 - 6.4
NOTE Means unable to perform the analysis (AGRI Notes No.2005 – 06 – 19, ISSN: 1655-9259).								

Annex B

Table 2 – The characteristics of the young coconut water

Proximates	g/ 100 g
Energy	109 kJ
Moisture	95.2 g
Nitrogen	0.04
Protein	0.2
Fat	0.0
Ash	0.2
Fructose	2.4
Glucose	2.7
Sucrose	1.5
Maltose	0.0
Lactose	0.0
Sugars, total	6.6
Starch	0.0
Available carbohydrate	6.6
Minerals	Mg/100 g
Calcium	12.0 mg
Copper	0.220
Iron	0.4
Magnesium	11.0
Manganese	1,020.0
Phosphorus	9.0
Potassium	186.0
Sodium	5.0
Vitamins	
Thiamin	0.01 mg
Riboflavin	0.02 mg
Niacin	0.10 mg
Niacin derived from tryptophan or protein	0.0 mg
Niacin equivalents	0.1 mg
Vitamin C	0 ug
Retinol	0 ug

Amino acids	mg
Alanine	10
Arginine	32
Aspartic acid	18
Cystine + Cysteine	4
Glutamic Acid	43
Glycine	10
Histidine	5
Isoleucine	8
Leucine	14
Lysine	10
Methionine	4
Phenylalanine	10
Proline	8
Serine	11
Threonine	9
Tryptophan	2
Tyrosine	6
Valine	12

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Annex C

Table 3 – Characteristics of other varieties of coconut grown in the Philippines

Variety	Fruit size	Fruit weight (g)	Fruit shape	Edible portion (%)	Flesh thickness (cm)	Nut size	Nut wt. (g)	Nut shape	Other features
NSIC 2000 Co 15 Aromatic Green Dwarf	Small to medium	672.0 ± 122.5	Round and ovoid	55.2 ± 2.9 Meat 28.9 ± 2.4 Water 26.3 ± 3.2	0.86 ± 0.1	Small to medium	481.1 ± 96.8	Almost round	Young tender nut; sweet water; thin endosperm
NSIC 2000 Co 16 West African Tall-WAT	Medium to large	942.6 ± 57.3	Round and angled	43.3 ± 13 Meat 32.0 ± 1.1 Water 11.4 ± 0.9	1.40 ± 0.1	Medium to large	568.4 ± 37.1	ovoid	
NSIC 2000 Co 17 Rennel Island Tall-RIT	Medium to large	1,824.9 ± 140.6	Oblong and egg	61.0 ± 0.9 Meat 33.5 ± 0.7 Water 27.6 ± 0.8	1.31 ± 0.1	Medium to large	1,393.0 ± 101.7	ovoid	
NSIC 2000 Co 18 Tacunan Green Dwarf-TACD	Medium to large	1,153.3 ± 94.7	oblong	49.1 ± 1.7 Meat 31.7 ± 1.3 Water 17.5 ± 1.5	1.14 ± 0.1	Medium to large	751.2 ± 63.8	ovoid	Highly tolerant to leaf spot

<p>NSIC 2000 Co 19</p> <p>PCA 15 - 8</p>	Medium to large	1,358.8 ± 179.0	round	<p>58.3 ± 2.9</p> <p>Meat 33.8 ± 1.7</p> <p>Water 24.5 ± 2.4</p>	1.24 ± 0.1	Medium to large	1,016 ± 150.2	Almost round	Resistant to strong winds
<p>NSIC 2000 Co 20</p> <p>PCA 15 - 9</p>	Medium to large	1,434.7 ± 184.7	round	<p>59.6 ± 1.7</p> <p>Meat 34.2 ± 1.4</p> <p>Water 25.4 ± 1.2</p>	1.28 ± 0.1	Medium to large	1,092.1 ± 144.2	Almost round	Resistant to strong winds
<p>NSIC 2000 Co 21</p> <p>PCA 15 - 10</p>	Medium to large	1,270.5 ± 120.0	Almost round	<p>56 ± 2.2</p> <p>Meat 33.1 ± 1.6</p> <p>Water 22.9 ± 1.5</p>	1.22 ± 0.1	Medium to large	928.5 ± 96.6	Almost round	Resistant to strong winds
<p>NSIC 2000 Co 22</p> <p>PCA 15 - 11</p>	Medium to large	1,067.2 ± 148.7	oblong	<p>47.9 ± 2.1</p> <p>Meat 31.5 ± 2.4</p> <p>Water 16.4 ± 2.2</p>	1.24 ± 0.1	Medium to large	692.2 ± 94.7	Almost round	Resistant to strong winds

NSIC 2000 Co 23 PCA 15 – 12	Medium to large	1,416.7 ± 163.1	Oblong	58.2 ± 2.3 Meat 34.8 ± 1.9 Water 23.4 ± 2.9	1.27 ± 0.1	Medium to large	1,057.3 ± 130.9	Almost round
NSIC 2000 Co 24 PCA 15 - 13	Medium to large	1,169.8. ±185.7	Oblong and egg	57.7 ± 2.0 Meat 34.9 ± 1.3 Water 22.8 ± 1.6	1.38 ± 0.1	Medium to large	861.7 ± 139.2	Almost round
NSIC 2000 Co 25 PCA 15 - 14	Medium to large	1,329.6 ±194.8	Oblong and egg	59.9 ± 2.1 Meat 34.5 ± 1.7 Water 25.4 ± 1.8	1.30 ± 0.1	Medium to large	1,004.5 ± 154.2	Almost round
NSIC 2000 Co 26 PCA 15 - 15	Medium to large	1,290.6 ±178.0	Oblong / Round	57.7 ± 2.7 Meat 34.5 ± 2.7 Water 23.2 ± 3.0	1.26 ± 0.1	Medium to large	940.9 ± 137.7	Almost round

Annex D

Table 4 – The characteristics of Laguna tall and Baybay tall coconuts

Indicative yield and traits	Tall varieties	
	Laguna (LAGT)	Baybay (BAYT)
Age at 1 st flowering (yr)	3 - 5	3 – 4.5
Age at 1 st nut Harvest (yr)	6	5
Nut size	Medium to large	Medium to large
Nut color (immature)	Green/brown	Green/brown
Nuts/kg copra (no.)	3.5 - 4	3 – 3.5
Nuts/palm/year (no.)	70	105
Nuts/ha/year (no.)	12,700	16,400
Copra/nut (g)	250	295
Copra/palm/year (kg)	20	30
Copra/ha/year (tons)	3.5	5
Weight of whole nut (kg)	1.440	1.550
Weight of husk (kg)	0.520	0.390
Weight of shell (kg)	0.220	0.250
Weight of fresh meat (kg)	0.425	0.530
Weight of water (kg)	0.270	0.380
Fruit Quality Value (FQV) ¹	0.37	0.45
Fruit length (cm)	16.30	18.80
Fruit width (cm)	16.33	18.83
Husk thickness (cm)	2.22	2.80
Meat thickness (cm)	1.32	1.36
Fatty Acid Profile (%)		
MCFA (C6:0 – 12:0) ²	63.80	67.88
Lauric (C12:0)	50.07	50.80
Oleic (C18:1)	6.28	3.99
Linoleic (C18:2)	1.06	0.73

Annex E

Varieties of coconut for tender coconut or 'Buko' production

E.1 All cultivars (tall and dwarf varieties, hybrids and synvars) can be utilized for 'Buko' production. High level of sweetness in aromatic dwarf (**AROD**), Galas dwarf (**GALD**) and Tacunan green dwarf (**TACD**) are preferred by some consumers. The sugar content of Tender Coconut or 'Buko' (for both TCW and TCM) is influenced by the following factors: genetic, potassium level as nutritional requirement of the palm tree and period of the year (weeks before maturity of the Tender Coconut).

E.2 Galas green dwarf (GALD) – Nuts are uniform, mostly medium with thick husk, spherical and well-balanced crown, nearly stout stem with conspicuously tapering base, slow upward growth, and with either green or yellow peduncle. GALD's immature fruits are deep green, has a fairly small bunch, with medium-sized nuts. The round fruit exhibits a flat-shaped nut inside. This variety can produce an average of 70 to 177 nuts within the same period. The plantation site is in Galas, Dipolog City. This variety is conserved at the PVA Zamboanga Research Center in San Ramon, Zamboanga City and at the Coconut Breeding Trials Unit-Panay State Polytechnic College, Mambusao, Capiz (Annex A).

E.3 Tacunan green dwarf (TACD) is locally known as "Bilaka" or "Linkuranay" (means to sit before) and an early bearing trait of this variety. TACD has medium to large nut with short and wide peduncle bearing short spikelets. It has thick and stubby spathe hollow in the tip, which exhibit cracks in the stigmatic end. Its fronds are borne on a spherical crown with wide leaflets. This variety can produce an average of 94 to 204 nuts within the same period. The plantation site is in Rabanuel's Farm, Tacunan, Davao City. This variety is presently conserved at Philippine Coconut Authority in Albay, Davao and Zamboanga Research Centers and CBTU-PSPC (Annex A).

E.4 The two commercially important Philippine tall varieties of coconut are Laguna Tall (**LAGT**) and Baybay Tall (**BAYT**) which are generally used for buko drink.

E.5 The recommended commercial varieties of coconut for tender coconut or 'Buko' production that weigh below 2 kg are: 'Coco Niño' (grown in Luzon), 'Pilipog Green Dwarf' (grown in Visayas and Mindanao), 'Aromatic Green Dwarf,' 'Malayan Yellow Dwarf' and 'Catigan Green Dwarf.' (Annex A).

Annex F

Illustration of whole, trimmed and dehusked tender coconut or 'Buko'

Whole



Trimmed



Dehusked



References

PNS/BAFPS 65:2008

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