

# PHILIPPINE NATIONAL STANDARD

PNS/BAFS 167:2015  
ICS 67.080.20

---

---

## Code of Hygienic Practice for Coconut Sap Sugar



### BUREAU OF AGRICULTURE AND FISHERIES STANDARDS

BPI Compound Visayas Avenue, Diliman, Quezon City 1101 Philippines  
Phone (632) 920-6131; (632) 455-2856; (632) 467-9039; Telefax (632) 455-2858  
E-mail: [bafpsda@yahoo.com.ph](mailto:bafpsda@yahoo.com.ph)  
Website: [www.bafs.da.gov.ph](http://www.bafs.da.gov.ph)

## **FOREWORD**

This Code of Hygienic Practice for Coconut Sap Sugar was developed in response to the growing consumer demand for high quality and nutritious food and alternatives. This Code also addresses the essential principles of food safety applicable to primary production, postharvest, transport operations and primary processing of coconut sap sugar. The Bureau of Agriculture and Fisheries Product Standards (BAFPS) developed the Philippine National Standard (PNS): Coconut sap Sugar - Grading and Classification (PNS/BAFPS 76:2010) in 2010. This Code, therefore, supplements those contained in the PNS/BAFPS 76:2010 or its latest revision and should be read in conjunction with it.

A Technical Working Group (TWG) for the development of the Code of Hygienic Practice for Coconut Sap Sugar was organized and represented by Philippine Coconut Authority (PCA), Industrial Technology Development Institute (ITDI), Food and Drug Administration (FDA), United Coconut Associations of the Philippines, Inc. (UCAP) and the Philippine Coconut Research and Development Foundation (PCRDF).

The Bureau of Agriculture and Fisheries Standards in collaboration with the members of the TWG conducted a series of technical reviews for the drafting of the standard and public consultations in Region X (Cagayan de Oro) and XII (General Santos). Comments gathered from the consultations with the stakeholders were considered and deliberated prior to the finalization of the standard.

## **INTRODUCTION**

Coconut is an agricultural and livelihood crop for many people in Southeast Asia, the Pacific region, Africa and some countries in Latin America. In fact, it is considered as a “tree of life” in developing countries as they depend on it as a source of food, medicine, shelter, fuel and furniture among others (Magat, 2006). In 2013, the total area planted to coconut is 3.55 million hectares where the province of Quezon registered as the largest area planted to coconut at 328.03 thousand hectares followed by Zamboanga del Norte, Leyte, Davao Oriental, and Zamboanga del Sur (PSA, 2014).

According to the Philippine Coconut Authority (PCA, 2006), the coconut tree provides fruit throughout the year for the fruit is edible at any stage of maturity. The fruit also serves as source or raw material in many food products such as coconut milk/cream, desiccated coconut, coconut chip, coconut water, nata de coco, coconut oil, etc. Aside from the fruit, the unopened inflorescence can produce coconut sap or toddy that can be further processed into food products such as coconut sap syrup, coconut sap sugar, tuba, lambanog, and vinegar.

In a study conducted by Food and Nutrition Research Institute (FNRI) on the nutritional and health benefits of coconut sap sugar, it was found to be a Low Glycemic Index (GI) Food. GI of foods is associated to the risk in diseases such as type II diabetes and coronary heart disease. Coconut sap sugar is produced from coconut sap or toddy, which is tapped from the unopened inflorescence and boiled. According to FAO, spontaneous and rapid fermentation is a characteristic of coconut sap. It can start alcoholic fermentation and become completely fermented within a day. When the fermentation exceeds 24 hours, the sap becomes stale.

This Code encompasses Good Agricultural Practices (GAP), Good Hygienic Practices (GHP) and Good Manufacturing Practices (GMP) that will help minimize microbiological, physical and chemical hazards associated with all stages of production to processing of coconut sap. Particular attention is given to minimizing microbiological hazards.

This Code provides general recommendations to allow flexible and uniform adoption even when production practices and environmental conditions are diverse. Therefore, this Code is also applicable to micro and small-scale producers.

## SECTION 1 - OBJECTIVES

The *Philippine National Standard (PNS) Code of Good Agricultural Practices for Fresh Fruits and Vegetables (PNS/BAFPS 49:2011)* and *Codex Code of Hygienic Practice for Fresh Fruits and Vegetables (CAC/RCP 53-2003)* already provide the relevant general hygienic recommendations for the primary production of fresh agricultural commodities.

The objective of this Code, therefore, is to provide specific guidance to coconut sap sugar producers by applying relevant recommendations of the *Codex Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4:2003)* and the *Food and Drug Administration (FDA) Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Department of Health Administrative Order No. 153 S. 2004)* or its latest issuance. Specific guidance is provided to minimize microbiological hazards from primary production to primary processing, packing and distribution of coconut sap sugar.

## SECTION 2 – SCOPE, USE OF DOCUMENT AND DEFINITIONS

### 2.1 Scope

This Code of Hygienic Practice applies to the production of coconut sap sugar as defined in this Code, derived from coconut sap obtained from the unopened inflorescence of coconut palm.

### 2.2 Use of the document

The provisions of this document are supplemental to and must be used in conjunction with, the *Codex Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4:2003)*, *FDA Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Department of Health Administrative Order No. 153 S. 2004)* or its latest issuance and *Coconut sap sugar – grading and classification (PNS/BAFPS 76:2010)*.

### 2.3 Definitions

#### **coconut sap sugar**

a sweetener in solid form derived from boiling of pure fresh coconut sap

**Code of Hygienic Practice for Coconut Sap Sugar****coconut sap**

also called “toddy”, is the sweet translucent liquid oozing out from the tapped unopened inflorescence of the coconut palm

**collection cycle**

starts from mounting of the collection vessel to the inflorescence until harvest of the sap, not exceeding five (5) hours

**control measure<sup>1</sup>**

any action and activity that can be used to prevent or eliminate a food safety hazard or reduce it to an acceptable level

**cleaning**

removal of food residues, dirt, grease or other objectionable material

**disinfection**

the reduction, without adversely affecting the food, by means of hygienically satisfactory chemical agents and/or physical methods, of the number of microorganisms to a level that will not lead to harmful contamination of foods

**minimize**

to reduce the likelihood of occurrence or the consequence of an unavoidable situation such as microbial growth

**potable water**

water fit for human consumption. Standards of potability should be no less than those contained in the latest edition of the “International Standards for Drinking Water”, World Health Organization

**primary production**

production, rearing or growing of primary products including harvesting

**processing**

any action that substantially alters the initial raw materials or product or ingredients including, but not limited to heating and a combination of processes intended to produce food

---

<sup>1</sup> For the purpose of this Code, a control measure encompasses any action or activity used to eliminate hazard or reduce it to an acceptable level. In addition the term refers to any action or activity taken to reduce the likelihood of the occurrence of a hazard in coconut sap and coconut sap syrup. Thus, control measures include both process controls such as heating, cooling, etc., as well as other activities such as general hygiene and pest control programmes, etc.

### SECTION 3 - PRIMARY PRODUCTION

These principles and guidelines supplement those contained in Section 3 of the *Codex Recommended International Code of Practice - General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4:2003)*, *FDA Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Department of Health Administrative Order No. 153 S. 2004)* or its latest issuance and *Coconut sap sugar – grading and classification (PNS/BAFPS 76:2010)*.

#### PRINCIPLES APPLYING TO THE PRIMARY PRODUCTION OF COCONUT SAP

Coconut sap sugar should not contain any contaminant at a level that compromises the appropriate level of public health protection, when presented to the consumer. The influence of primary production activities on the safety of coconut sap, potential microbiological contamination from all sources should be minimized to the greatest extent practicable. Microbiological hazards can be introduced from the farm environment and farming practices, thus, relevant provisions of Good Agricultural Practices (GAP) should be followed to ensure food safety and prevent inappropriate practices that may lead to unacceptable levels of contamination during primary production.

#### 3.1 Environmental Hygiene

Coconut sap should be protected from contamination brought by human and animal influences: domestic, industrial and agricultural wastes that may be present at levels likely to become a health hazard. Adequate and appropriate precautions should be taken to ensure that these wastes are not used and are disposed of in a manner that will not contaminate the coconut sap.

To prevent possible ecological imbalance, growers should use biological controls that are authorized for the cultivation of coconut tree and should be used in accordance with the approved instructions for the intended purpose/s and in compliance with the regular rules and recommendations of Fertilizer and Pesticide Authority (FPA).

Control measures involving treatment with chemical, physical or biological agents should only be undertaken as necessary and with a thorough understanding of the potential hazards to health.

## **3.2 Hygienic production of coconut sap**

### **3.2.1 Harvesting techniques**

Harvesting operations and methods should be conducted with consideration on the possible sources of contamination. Harvesting tools, implements and equipment that have direct contact with the sap should be cleaned and disinfected regularly.

Equipment, containers or any other collecting vessels used for harvesting should be made from non-toxic materials. They should be designed and constructed in such a way that they can be cleaned, disinfected and maintained to avoid contamination. They should be kept sanitary through regular cleaning. Generally, polyethylene terephthalate (PET) plastic is used as vessel to collect the dripping sap. Cleaning may be done through rinsing with soap and water to remove coconut sap left in the vessel that may trigger the fermentation process. Containers previously used for toxic materials shall not be used for holding the coconut sap.

In sap collection, it is recommended to select bearing trees with healthy unopened inflorescence. Interval of collection of coconut sap or toddy is generally every five (5) hours to prevent fermentation and maintain pH not lower than six (6). Coconut sap gathered must be evaluated for the following: pH ( $\geq 6$ ), and clarity (translucent to clear). Determining the pH and clarity is important to detect the degree of fermentation of the sap. The harvested sap should be processed right after collection. This is to avoid the start of the fermentation process. Once fermentation begins, the coconut sap will not form any sugar granules.

### **3.2.2 Transportation of raw material**

Conveyances for transporting the harvested coconut sap should be made of such material and construction that will permit easy and thorough cleaning. Facilities should be clean and maintained clean and when necessary disinfected so as not to constitute a source of contamination to the coconut sap. All handling procedures should prevent the coconut sap from being contaminated. Care should be taken to prevent fermentation and to protect against contamination.

### **3.2.3 Removal of unfit raw material.**

Fermented coconut sap, which is not suitable for coconut sap sugar production should be segregated during harvesting and processing to avoid contamination of raw material or other food materials. Those that are unfit can be further processed into coconut sap

syrup, vinegar or lambanog. Proper disposal of the unfit raw material should be strictly followed to prevent possible mixing with the sap for sugar production.

## **SECTION 4 - PRIMARY PROCESSING**

### **4.1 Preparation and processing**

#### **4.1.1 Conversion of sap into syrup**

The production of coconut sap sugar is highly dependent on critical parameters such as pH, temperature, and level of microbial activity of natural yeast present in the sap. Coconut sap should be strained prior to boiling to remove unnecessary materials. The pH level of the sap should not be lower than six (6) otherwise, fermentation may occur.

Boiling is usually done at around 115°C for three (3) to four (4) hours depending on the volume to remove the water content of the sap. When the liquid is already boiling, scum or foam will be produced and should be removed to avoid the formation of dark residues on the final product. Constant and vigorous stirring of the boiling sap will hasten the conversion of the sap into syrup form.

#### **4.1.2 Conversion of syrup into granulated sugar**

The transfer of the syrup to a smaller cooking vessel under low heat source with continuous stirring should be done to allow cooling and prevent burning. Stirring allows air to enter into the sticky syrup which will cause the gradual cooling of the mixture resulting to granulation.

#### **4.1.3 Sieving and drying of coconut sap sugar**

Granules may be reduced in particle size using a food grade stainless steel sieve or similar material, to produce uniform granules.. The granules should be allowed to dry in a clean, dry and enclosed room for at least one (1) hour to reduce the moisture content to about 4%.

### **4.2 General hygienic practice**

#### **4.2.1 Control of pest and other contaminants**

Pests should be controlled in a way that does not contribute to the contamination of the raw materials, finished product or the processing area with chemical residues. Likewise,

**Code of Hygienic Practice for Coconut Sap Sugar**

precautions should be taken to protect the product from microbiological and physical contaminants as well as other objectionable substances.

**4.2.2 Packaging**

Care should be taken to ensure that coconut sap sugar is not contaminated. It should not be manually handled. Mechanical devices, containers, scoops or other implements constructed of impervious materials should be used to prevent contamination. Such implements should be washed and disinfected before and after use.

Packaging materials should be handled in a sanitary manner and stored in a clean, dry place. Packaging materials shall be food grade and suitable for intended use. Packaging activities should be done in a separate room under conditions that preclude the introduction of contamination into the product. All workers and food handlers should follow practices indicated in the *Codex Recommended International Code of Practice-General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4:2003)* and the *FDA Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Department of Health Administrative Order No. 153 S. 2004)* to avoid contamination.

**4.2.3 Handling, storage and transport**

The finished product should be stored and transported in a clean, cool and dry place to prevent infestation and contamination with or development of pathogenic microorganisms. Transport of products at ambient temperature will protect the product against deterioration. Exposure to high heat or extreme conditions should be avoided.

**4.2.4 Equipment and utensils**

All food contact surfaces should be smooth; free from pits, crevices and loose scale; non-toxic; resistant to corrosion and capable of withstanding repeated exposure to normal cleaning and disinfection; and non-absorbent unless the nature of a particular and otherwise acceptable process renders the use of a surface, such as wood, necessary.

All equipment in boiling and packing sections coming into direct contact with coconut sap should be made of a food grade material such as stainless steel and should be cleaned and sanitized before and after use. There should be regular cleaning schedule for all equipment and food contact materials used during processing.

### 4.3 Documentation and record keeping

With respect to food safety, records should be kept where necessary, on:

- Use of chemicals;
- Date and time of harvest of coconut sap;
- Volume and condition (pH and clarity) of harvested sap;
- Date and time of processing;
- Time-temperature of boiling;
- Volume of production, and;
- Date processed/manufactured.

## SECTION 5 - ESTABLISHMENT: DESIGN AND FACILITIES

### 5.1 Plant Construction and Layout

#### 5.1.1 Location, size and sanitary design

The buildings and surrounding area:

- should be located in a flood-free area and of considerable distance from possible source of contamination;
- should be kept reasonably free from objectionable odours, smoke, dust, or other contamination;
- should be of sufficient size for the purpose intended without crowding of equipment or personnel;
- should be of sound construction and kept in good repair;
- should be constructed as to protect against the entrance and harbouring of insects, birds or vermin and environmental contaminants such as dust and smoke;
- should be designed as to permit easy and adequate cleaning; and
- should be designed as to provide separation, by partition, location or other effective means between operations, which may cause cross contamination.

Floors where appropriate, should be of water-proof, non-absorbent, washable, and non-slip material, without crevices, and should be easy to clean and disinfect. Floors should slope sufficiently for liquids to drain to trapped outlets.

Walls and ceiling should be so designed, constructed and finished as to prevent the accumulation of dirt and minimize condensation, mold development and flaking and should be easy to clean.

Doors should be self-closing and close-fitting.

### 5.1.2 Sanitary facilities and control

- The water supply should be of potable quality.
- Disposal of waste should be effected in such a manner as to prevent contamination of potable water supplies.
- Premises should be well lit and ventilated. Good ventilation is important to prevent mould growth.
- Adequate lighting should be provided throughout the establishment. Shatter-proof light bulbs, fixtures, skylights and the like suspended over food in any step of preparation should be provided or otherwise, there shall be protection against food contamination in case of glass breakage.
- Toilet rooms should be well lit and ventilated and should not open directly into a food processing area. They should be kept in a sanitary condition at all times.
- There should be hand washing facilities in the toilet area with signage requiring personnel to wash their hands properly.
- Hand washing facilities should also be provided in all processing areas.

## SECTION 6 - CONTROL OF OPERATION

These principles and guidelines are supplemental to those contained in Section 5 of the *Codex Recommended International Code of Practice-General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4:2003)* including the *Annex on Hazard Analysis and Critical Control Point (HACCP) System and Guidelines* for its Application.

### 6.1 Key aspects of hygiene control systems

#### 6.1.1 Temperature and time controls

Coconut sap should be processed within five (5) hours of collection cycle. Coconut sap sugar should be stored at room temperature such that growth of microbiological food safety hazards will be minimized and the product suitability will not be adversely affected and within the declared shelf life. The combination of control measures should effectively eliminate the risk hazards in the raw material and the final product.

#### 6.1.2 Management of products within the plant

The principle of “first in, first out” (FIFO) should apply. The flow of product within the equipment and through the processing facility should maintain a forward progression from the receipt of coconut sap or toddy to packaging of coconut sap sugar so as to avoid cross contamination.

## SECTION 7 - PERSONAL HYGIENE

All workers and food handlers should act in accordance with the *Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev 4:2003)* and the *FDA Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (Department of Health Administrative Order No. 153 S. 2004)* or its latest issuance to maintain an appropriate degree of personal cleanliness; and operate in an appropriate manner.

All workers with direct contact with the food, food contact surfaces, and food packaging materials shall strictly conform to hygienic practices while on duty to protect against contamination of the product. There shall be established documented procedures and work instructions made known to all workers for maintaining cleanliness and following hygienic practices.

## SECTION 8 - END PRODUCT SPECIFICATION

Coconut sap sugar should be clean, sound, wholesome product of the coconut sap obtained from the inflorescence of coconuts. To the extent possible in good manufacturing practice the product should be free from extraneous matter.

The product should not contain pathogenic microorganisms such as *Salmonellae* and *E. coli* and should conform to the microbiological characteristics specified in *Philippine National Standard for Coconut Sap Sugar – grading and classification (PNS/BAFPS 76-2010 rev. 2011)*.

## SECTION 9 - PRODUCT INFORMATION AND CONSUMER AWARENESS

### 9.1 Labeling

Coconut sap sugar should be labeled in accordance with the *Current FDA labeling requirements for Pre-packaged Food Products (Department of Health Administrative Order No. 2014-0030)* or its latest issuance. Labels must be printed legibly in accordance to the FDA labeling guidelines in order to assure their adherence to the product during storage and distribution.

**REFERENCES:**

- Baguio, R & Mangay-ay C. 2009. *Coco Sap Sugar Processing*. Zamboanga City: Western Mindanao State University.
- Bureau of Agriculture and Fisheries Product Standards (BAFP). Philippine National Standard (PNS): Coconut sap sugar – grading and classification (PNS/BAFPS 76:2010).
- Bureau of Agriculture and Fisheries Product Standards (BAFPS). Philippine National Standard (PNS): Code of Good Agricultural Practices for Vegetable Farming (PNS/BAFPS 49:2011).
- Codex Alimentarius Commission (CAC). Code of Hygienic Practice for Milk and Milk Products (CAC/RCP 57-2004).
- Codex Alimentarius Commission (CAC). Code of Hygienic Practice for Low and Acidified Low Acid Canned Foods (CAC/RCP 23-1979).
- Codex Alimentarius Commission (CAC). Recommended International Code of Practice – General Principles of Food Hygiene (CAC/RCP 1-1969, Rev. 4, 2003).
- Department of Health Food and Drug Administration (DOH-FDA). 2004. Revised Guidelines on Current Good Manufacturing Practice in Manufacturing, Packing, Repacking, or Holding Food (DOH Administrative Order No. 153 Series 2004).
- Department of Health Food and Drug Administration (DOH-FDA). 2014. Revised Rules and Regulations Governing the Labeling of Prepackaged Food Products further amending certain provisions of Administrative Order No. 88-B series 1984 or the “Rules and Regulations Governing the Labeling of Prepackaged Food Products Distributed in the Philippines,” and for other purposes (DOH Administrative Order No. 2014-0030).
- Department of Science and Technology Food and Nutrition Research Institute (DOST-FNRI). Undated. Nutritional and Health Benefits of Coconut Sap Sugar/Syrup. Retrieved from [http://www.coconutresearchcenter.org/TPTrinidad\\_FNRI.pdf](http://www.coconutresearchcenter.org/TPTrinidad_FNRI.pdf) last 14 September 2015.
- Food and Agriculture Organization (FAO). 1999. *Coconut: Postharvest operations*.
- Magat, S. 2006. *Philippine Coconut Authority: Good Agricultural Practices in Coconut Production*.

**Code of Hygienic Practice for Coconut Sap Sugar**

Philippine Coconut Authority (PCA). 2006. PCA Davao Research Center Techno Guide Sheet No. 16 Series of 2006. Retrieved from <http://www.pca.da.gov.ph/coconutrde/images/cfs16.pdf> last 20 September 2015.

Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD). 2010. Profitability analysis: Coconut Sap Sugar Production module - Profitability Analysis No. 12/2010.

Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD). 2013. Compendium of commercially-viable coconut technologies.

Philippine Statistics Authority (PAS). 2014. Major crops statistics of the Philippines 2009-2013.

**TECHNICAL WORKING GROUP (TWG) FOR THE DEVELOPMENT OF  
THE PHILIPPINE NATIONAL STANDARD (PNS) CODE OF HYGIENIC  
PRACTICE (COHP) FOR COCONUT SAP SUGAR**

Chairperson:

**Karen Kristine A. Roscom**  
OIC Executive Director  
Bureau of Agriculture and Fisheries Standards (BAFS)

Members:

<b>Ms. Josephine T. Nieva</b>	Philippine Coconut Authority (PCA)
<b>Ms. Fria Lauren M. Jadulang</b>	Philippine Coconut Authority (PCA)
<b>Ms. Joanna L. Mari Freo</b>	Philippine Coconut Authority (PCA)
<b>Ms. Teresita S. Palomares</b>	Industrial Technology Development Institute (ITDI)
<b>Ms. Una Grace M. Dollete</b>	Industrial Technology Development Institute (ITDI)
<b>Ms. Maria Theresa C. Cerbolles</b>	Food and Drug Administration (FDA)
<b>Ms. Yvonne V. Agustin</b>	United Coconut Association of the Philippines (UCAP)
<b>Ms. Vermelyn O. Evangelista</b>	Philippine Coconut Research and Development Foundation (PCRDF)

Technical Secretariat:

Ms. Mary Grace R. Mandigma / Ms. Lara Vivas-Navarro, BAFS  
Ms. Katrina L. Maminta / Ms. Farlash D. Pancho, BAFS



**BUREAU OF AGRICULTURE AND FISHERIES STANDARDS**

---

---

**BPI Compound Visayas Avenue, Diliman, Quezon City 1101 Philippines**

**T/ (632) 920.6131 / 455.2856 / 467.9039**

**TF/ (632) 455.2858 / 456.6552**

**E-mail: [bafpsda@yahoo.com.ph](mailto:bafpsda@yahoo.com.ph)**

**Website: [www.bafs.da.gov.ph](http://www.bafs.da.gov.ph)**