

PHILIPPINE NATIONAL STANDARD

PNS/BAFS 29:2017

Dried Cassava Chips and Granules for Feed and Industrial Use



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Foreword

The Philippine National Standard (PNS) for the Dried Cassava Chips and Granules was established and adopted last 2010. In 2016, a call for the revision of the PNS/BAFPS 29:2010 was made in order to account for recent scientific and technological data from local and international studies on the specifications for dried cassava chips, granules and grates derived from roots of cassava (*Manihot esculenta*).

With the initiative of the Department of Agriculture (DA) through the Bureau of Agriculture and Fisheries Standards (BAFS), a Technical Working Group (TWG) for the revision of the said standard was created through Special Order No. 943 Series of 2016 with representation from other government sector namely the Bureau of Plant Industry (BPI), DA - Corn and Cassava Program, Philippine Center for Postharvest Development and Mechanization (PHilMech) and DA Regional Field Office V - Albay Experiment Station. Professors and technical personnel from the academe through the Benguet State University (BSU) and Visayas State University (VSU) were also members of the TWG.

During the series of technical reviews, the TWG assessed the need for the separation of the provisions for dried cassava products for food purposes from the dried cassava products used for feed and industrial use. Thus, the PNS/BAFPS 29:2010 resulted into two (2) different standards: (1) Dried cassava chips and grates for food and (2) Dried cassava chips and granules for feed and industrial use.

This document was drafted in accordance with the editorial rules of the BPS Directives, Part 3.

This Standard cancels and replaces the provisions recommended by PNS/BAFPS 29:2010 for the feed and industrial use.

1 Scope

This standard applies to dried cassava chips and granules, derived from peeled or unpeeled roots of cassava (*Manihot esculenta*), intended for processing into feed and industrial raw materials (ie. alcohol and bioethanol). Further, this standard specifies requirements for dried cassava chips, and granules to fit for the intended purpose.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

PNS/BAFPS 29:2010 – *Dried Cassava chips and granules*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

ash

soluble or insoluble residues obtained after 100% combustion of dried cassava chips or granules

3.2

contaminants

any unwanted materials found in the product whether organic or inorganic like dust, dirt, plastic, stone, metals, and other foreign matter in the processing of dried cassava chips and granules

3.2.1

chemical

include residual pesticides and unintentional chemicals in the processing of dried cassava chips and granules

3.2.2

microbial

include spoilage and toxin-producing microorganism

3.2.3

physical

include dust, dirt, plastic, stone, metals, and other foreign matters found in dried cassava chips and granules

3.3

crude fiber

residue remaining after digesting dried cassava chips or granules with acid and alkaline, and which can be burnt

3.4

discoloration

deviation from the normal color of the variety

3.5

dried cassava chips

dried cassava of irregular sizes and shapes, prepared by chipping and drying from fresh and clean cassava roots

3.6

dried cassava granules

dried cassava of varying sizes, smaller than chips, prepared by granulating fresh and clean cassava roots or dried cassava chips

3.7

hydrocyanic acid

total hydrocyanic acid which includes the hydrocyanic acid which maybe enzymatically released from a cyanogenic glycoside as well as any free or unbound hydrocyanic acid in cassava, expressed as milligrams of hydrocyanic acid per kilogram of cassava by-products (mg/kg)

3.8

sand

unconsolidated granular material consisting of mineral, rock or biological fragments between 63 micrometers and 2 mm in diameter

4 Essential composition and quality factors

4.1 General

4.1.1 Dried cassava chips and granules should be free from contaminants and suitable for the specific purpose.

4.1.2 Dried cassava chips and granules for feeds should be devoid of unpleasant odor and within the acceptable range of discoloration.

4.2 Specific

4.2.1 Dried cassava chips and granules shall conform to the requirements specified in Table 1.

Table 1 – Minimum requirements for dried cassava chips and granules

Properties	Specification		
	For feed		For industrial use
	Peeled	Unpeeled	
Maximum Hydrocyanic acid (HCN), dry weight basis, mg/kg	15	30	---
Minimum starch, percentage (%)	60	50	70
Maximum ash, percentage (%)	3	7	4
Maximum impurities, percentage (%)	2	3	3
Maximum crude fiber, percentage (%)	3	6	5
Maximum moisture content, percentage (%)	13		14
Maximum aflatoxin content, µg/kg	50		---

4.2.2 Level of discoloration for dried cassava chips and granules shall not exceed 50% by weight (refer to Annex A for list of recommended cassava varieties).

4.2.3 Dried cassava chips shall be at an average of 0.84 cm in thickness.

4.2.4 Dried cassava granules shall be 0.8 cm by 2.0 cm by 1.5 cm as average dimension.

5 Contaminants

5.1 Heavy metals

Dried cassava chips and granules shall comply with the heavy metal limits established by Codex Alimentarius Commission for roots and tubers as specified under Codex STAN 193-1995, Amd. 2016: General Standard for Contaminants and Toxins in Food and Feed or its equivalent PNS.

5.2 Pesticide residues

Dried cassava chips and granules shall comply with those maximum residue limits established by the Codex Alimentarius Commission for this commodity.

5.3 Mycotoxins

Dried cassava chips and granules shall comply with those mycotoxin limits established by the Codex Alimentarius Commission for this commodity.

6 Hygiene

It is recommended that the product covered by the provisions of this standard, intended for feed, be prepared and handled in accordance with the appropriate sections of Codes of Practice recommended by the Codex Alimentarius Commission which are relevant to this product.

7 Packaging

7.1 Dried cassava chips and granules shall be packed in polypropylene (PP), = laminated sacks or any suitable packaging materials which are safe, clean and suitable for their intended use; and should not impart any toxic substance or undesirable odor to the product.

7.2 When the product is packaged in polypropylene (PP) or laminated sacks, these must be durable and properly sewn or sealed.

8 Labelling

Information on the label shall include the following:

8.1 Nature of Product

Name of the product and variety (optional)

8.2 Origin of the Product

Name and address of the producer and/or packer

8.3 Commercial identification

Net weight, packing date, best before and lot identification

9 Methods of analysis

9.1 Crude fiber

ISO 5498 (1981) – Determination of Crude Fiber Content- B.S. Separation by filtration through filter paper – General Method.

9.2 Ash and sand

ISO 2171 (2007) – Cereals, Pulses and By Products –Determination of Ash by Incineration

9.3 Starch content

European Economic Community Polarimetric (EEC) Method.

9.4 Hydrocyanic acid content

Centro Internacional de Agricultura Tropical (CIAT) Rapid Picrate Assay Method.

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Codex Alimentarius Commission. Codex Standard for Edible Cassava Flour (Codex STAN 176-1989, Amd. 2013).

Codex Alimentarius Commission. Codex Standard for Sweet Cassava (Codex STAN 238 2003, Amd. 3-2013).

Thai Industrial Standard for Tapioca Products. TIS 52-2516 (1973).

Annex A
(informative)

List of Recommended Cassava Varieties
Table A.1 List of National Seed Industry Council (NSIC) Registered Cassava Varieties

Variety	Potential Yield (MT/ha)	Starch Content (%)	Dry Matter Content (%)	HCN Content
UPL-Ca1 (Datu 1)	30-40	21.4	33.8	Moderate
UPL-Ca2 (Lakan 1)	35-45	25.0	36.4	Low
UPL-Ca3 (Sultan 1)	40-50	20.9	33.5	Moderate
UPL-Ca4 (Vassorinha)	25-35	21.4	33.8	Moderate
UPL-Ca5 (Sultan 2)	25-35	21.1	33.6	High
VC-1 (CMC-323-52)	40.8	21.4	33.8	Moderate
VC-2 (CMC-40)	40.2	20.3	33.0	Low
VC-3 (CM-3590-1)	30.0	20.9	33.5	Moderate
PSB Cv-9 (CM-4014)	32.9	21.4	33.8	Moderate
PSB Cv-10 (Mcol 1684)	41.5	21.1	33.5	High
PSB Cv-11 (Lakan 2)	25.0	21.8	34.1	Low
PSB Cv-12 (Lakan 3)	24.1	21.5	33.9	Low
PSB Cv-13 (CMP 62-15)	26.4	22.8	34.8	Low
PSB Cv-14 (CMP 21-15)	29.4	20.3	33.4	Moderate
PSB Cv-15 (Lakan 4)	24.0	21.9	34.2	Low
PSB Cv-16 (CMP 32-10)	33.6	20.8	33.4	Low
PSB Cv-17 (Sultan 3)	39.3	18.9	32.0	Moderate
PSB Cv-18 (Sultan 4)	39.0	19.6	32.5	Moderate

Table A.1 (continued)

Variety	Potential Yield (MT/ha)	Starch Content (%)	Dry Matter Content (%)	HCN Content
PSB Cv-19 (SM 803-1)	32.3	22.9	34.9	Moderate
PSB Cv-20 (Sultan 5)	35.3	23.4	35.3	Moderate
NSIC Cv-21 (SM 818-1)	28.2	27.6	38.4	Moderate
NSIC Cv-22 (KU 50)	31.3	27.0	38.0	Moderate
NSIC Cv-23 (QMR 33-12-3)	26.1	28.5	38.9	Moderate
NSIC Cv-24 (QMR 33-12-7)	24.1	27.2	38.0	Moderate
NSIC Cv-25 (Sultan 6)	40.7	26.8	37.6	Moderate
NSIC Cv-26 (Sultan 7)	30.5	23.0	35.0	Moderate
NSIC Cv-27 (Datu 2)	30.7	22.8	34.8	Moderate
NSIC Cv-28 (QMR 36-05-59)	36.9	27.6	38.3	Low
NSIC Cv-29 (Rajah 1)	29.1	30.1	40.1	Low
NSIC Cv-30 (Rayong 5)	32.4	29.4	40.1	Low
NSIC Cv-31 (Rajah 2)	32.4	29.4	40.1	Low
NSIC Cv-32 (CM 9165-17)	30.9	29.6	39.3	Low
NSIC Cv-33 (Sultan 8)	31.4	39.1	38.0	Moderate

**Annex B
(informative)**

Cyanogen content modified scoring system

**Table B.1 - Modified Scoring System for Total Cyanogens by the Philippine
Root Crops Research and Training Center, Visca, Baybay City**

Cyanogen content	Score	Total cyanogens (mg/kg) as HCN, fw
Low	1-4	0-40
Moderate	5-7	> 40 -115
High	8-9	>115

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