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**Biofortified Orange Fleshed Sweetpotato
(OFSP) puree— Specification**

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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 640 was prepared by Technical Committee RSB/TC 22, *Nutrition and Foods for Special Dietary Uses*.

Committee membership

The following organizations were represented on the Technical Committee on *Nutrition and Foods for Special Dietary Uses* (RSB/TC 22) in the preparation of this standard.

Africa Improved Foods (AIF)

Alpha Natural Resources Company (ANARECO Ltd)

Amazon Nutrition Cabinet

Farmfresh Company Ltd

Global Alliance for Improved Nutrition (GAIN)

ISHYO FOODS Ltd

MINIMEX Ltd

National Child Development Agency (NCDA)

National Industrial Research and Development Agency (NIRDA)

One Acre Fund TUBURA

Rwanda Consumer's Rights Protection Organization (ADECOR)

Rwanda Food and Drugs Authority (Rwanda FDA)

Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)

Scaling Up Nutrition (SUN Business Network)

SOSOMA Industries

The International Potato Center (CIP)

University of Rwanda, College of Agriculture, Forestry and Food Science (UR- CAFF)

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Introduction

Recognition of the health benefits of pro-vitamin A orange-fleshed sweetpotato (OFSP) has inspired the crop's utilization in processed products such as pre-cut, cubed, mashed or pureed sweetpotato.

Biofortified Orange fleshed sweetpotato (OFSP) puree provides a cost effective and nutritious alternative to wheat flour, since it can replace up to 30-60% of the flour in a range of baked or fried products. It can also reduce the amount of sugar used in dough by as much as 70%, and the amount of oil by 30%, lowering the overall cost of production of wheat-based products by 12-20% (CIP, 2013)

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Biofortified Orange Fleshed Sweetpotato (OFSP) puree— Specification

1 Scope

This Draft Rwanda Standard specifies requirements, sampling and test methods for puree obtained from the processing of Biofortified Orange Fleshed Sweetpotato from varieties of *Ipomoea batatas* Lam intended for human consumption.

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.

AOAC 2016.13, *Determination of Lutein, β -Carotene, and Lycopene in Infant Formula and Adult Nutritionals by Ultra-High-Performance Liquid Chromatography*

AOAC 925.10, *Solids (Total) and moisture in flour. Air oven method*

AOAC 965.22, *Sorting corn grits, Sieving method.*

AOAC 999.11, *Lead, Cadmium, Copper, Iron and Zinc in Foods. Atomic absorption Spectrophotometry after dry ashing*

ISO 23719, *Cereals and cereal products — Determination of 17 mycotoxins by ultra-high-performance liquid chromatography and tandem mass spectrometry method (UHPLC-MS/MS)*

RS CXC 44, *Code of Practice for Packaging and Transport of Fresh Fruit and Vegetables*

RS CXC 53, *Code of Hygienic Practice for Fresh Fruits and Vegetables*

RS CXS 192, *General standard for food additives*

RS CXS 193, *Codex general standard for contaminants and toxins in food*

RS EAS 38, *Labelling of pre-packaged foods — General requirements*

RS EAS 900, *Cereals, pulses and their products — Sampling*

RS ISO 16050, *Foodstuffs — Determination of aflatoxin B1, and the total content of aflatoxins B1, B2, G1 and G2 in cereals, nuts and derived products — High-performance liquid chromatographic method*

RS ISO 16649-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of beta-glucuronidase-positive Escherichia coli Part 2: Colony-count technique at 44 degrees C using 5-bromo-4-chloro-3-indolyl beta-D-glucuronide*

RS ISO 21527-2, *Microbiology of food and animal feeding stuffs — Horizontal method for the enumeration of yeasts and moulds Part 2: Colony count technique in products with water activity less than or equal to 0,95*

RS ISO 2171, *Cereals, pulses and by-products — Determination of ash yield by incineration*

RS ISO 4833-1, *Microbiology of the food chain — Horizontal method for the enumeration of microorganisms Part 1: Colony count at 30 °C by the pour plate technique*

RS ISO 5498, *Agricultural food products — Determination of crude fibre content — General method*

RS ISO 5985, *Animal feeding stuffs — Determination of ash insoluble in hydrochloric acid*

RS ISO 6579-1, *Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of Salmonella Part 1: Detection of Salmonella spp.*

3 Terms and definitions

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

3.1

Biofortified Orange Fleshed Sweetpotato (OFSP)

highly nutritious biofortified root crop obtained from a plant of the *Ipomoea batatas* (L.) Lam that is conventionally bred to contain high levels of beta-carotene

3.2

Biofortified Orange Fleshed Sweetpotato puree

ready to eat food obtained through appropriate processing (for example blending or mashing) of sound roots of biofortified orange fleshed sweetpotato into a smooth, homogeneous and soft consistency which does not require or encourage chewing before being swallowed.

3.3

foreign matter

any organic and inorganic material other than ingredients used

3.4

extraneous matter

organic matter originating from food plants and/or their products other than Biofortified Orange Fleshed Sweetpotato puree

3.5

food grade packaging material

packaging material, made of substances which are safe and suitable for their intended use and which will not impart any toxic substance or undesirable odour or flavour to the product

4 Requirements

4.1 Ingredients

4.1.1 Essential ingredients

Orange fleshed sweetpotato complying with DRS 638.

4.1.2 Optional ingredients

Optional ingredients for preparing Biofortified Orange Fleshed Sweetpotato puree shall comply with relevant standards. They include but are not limited to the following:

- a) cereals;
- b) nuts;
- c) sugar (only in products to be consumed by persons older than 24 months);
- d) salt;
- e) meat;
- f) fish;
- g) fruits
- h) spices;
- i) milk and milk products; and
- j) flavours.

4.2 General requirements

4.2.1 Biofortified orange-fleshed sweet puree shall:

- a) be produced from orange-fleshed sweet potato complying with DRS 638;
- b) exhibit uniform orange colour;
- c) be free from off-flavours and odours; and
- d) be practically free from any living insects and foreign matter.

4.2.2 Fish, meat and poultry ingredients when used shall be practically free from bone pieces

4.2.3 If sugar is used in the preparation of Biofortified Orange Fleshed Sweetpotato puree, the total energy contributed from added sugar shall not exceed 10 %.

4.3 Specific requirements

4.3.1 Bio fortified orange-fleshed sweet potato puree shall comply with specific requirements given in Table 1 when tested in accordance with test methods specified therein.

Table 1 — Specific requirements for Biofortified orange fleshed sweetpotato puree

S/N	Characteristic	Requirement		Test method
i.	Moisture, % by mass, max	80		AOAC 925.10
ii.	Total ash content, %, by mass, max	2		RS ISO 2171
iii.	Crude fibre, % by mass on dry weight basis, max	2.0		RS ISO 5498
iv.	Total sodium content, mg Na/100 g, max.	200		ISO 8070
v.	Acid insoluble ash (on dry basis.), percent by mass, max.	0.2		RS ISO 5985
vi.	Dry extract, g/100g	Low viscosity	12 - 14	Annex A
		Moderate viscosity	15 - 30	
		High viscosity	31 - 40	
vii.	Beta-carotene (provitamin A) mg/100g, min	3		AOAC 2016.13

5 Specific prohibitions

5.1 Biofortified orange fleshed sweetpotato puree and its ingredients intended for older infants and young children, shall not have been treated by ionizing radiation.

5.2 Biofortified orange fleshed sweetpotato puree shall not contain partially hydrogenated fats and oils.

6 Food additives

Food additives, when used, shall comply with RS CXS 192.

7 Flavouring agents

Flavouring agents, when used, shall be in accordance with RS CXG 66.

8 Hygiene

8.1 Biofortified orange fleshed sweetpotato puree shall be prepared and handled in a hygienic manner in accordance with RS CXC 1.

8.2 Biofortified orange fleshed sweetpotato puree shall not exceed microbiological limits specified in Table 2 when tested in accordance with test methods specified therein.

Table 2 — Microbiological limits in Biofortified orange fleshed sweetpotato puree

S/N	Microorganism	Limit	Test method
i.	Total Viable count, CFU/g	10 ³	RS ISO 4833-1
ii.	Salmonella spp in 25 g	Absent	RS ISO 6579-1
iii.	Staphylococcus aureus, CFU/g	<10 ^a	RS ISO 6888-1
iv.	Yeasts and moulds, CFU/g, max.	10 ²	RS ISO 21527-2
v.	Bacillus cereus, CFU/g, max.	50	RS ISO 7932

^a Less than 10 CFU/g means that it is not detectable in that sample hence may commonly be referred to as absent.

9 Contaminants

9.1 Pesticide residues

Biofortified orange-fleshed sweet potato puree shall comply with maximum pesticide residue limits established by the Codex Alimentarius Commission.

9.2 Heavy metals

Biofortified orange-fleshed sweet potato puree shall not exceed maximum levels for heavy metals in table 3 when tested in accordance with test methods specified therein.

Table 3 —Maximum Level for heavy metals in Biofortified orange fleshed sweetpotato puree

S/N	Heavy metal	Maximum limit mg/kg	Test method
i.	Lead	0.1	AOAC 999.11
ii.	Cadmium	0.1	
iii.	Tin ^a	250	ISO 14377

^a Tin applies only to canned puree.

9.3 Mycotoxin

Biofortified orange-fleshed sweetpotato puree shall not exceed maximum levels for heavy metals in table 3 when tested in accordance with test methods specified therein.

Table 3— Maximum Levels for heavy metals in Biofortified orange fleshed sweetpotato puree

S/N	Parameter	Maximum limit	Test method
i	Total aflatoxins, µg/kg	10	ISO 16050
ii	Aflatoxin B1, µg/kg	5	
iii	Fumonisin, mg/kg	2	AOAC 2001.04
iv	Deoxynivalenol (DON), mg/kg	0.2	AOAC 986.18

9.4 Anti-nutritional factors

9.4.1 If soya is used as an ingredient of puree food:

- a) urease activity shall not exceed 0.3 mg N/g/min when tested in accordance with RS ISO 5506; and
- b) trypsin inhibitor activity shall not exceed 5 mg/g when tested in accordance with RS ISO 14902

9.4.2 If sorghum is used as an ingredient of Biofortified orange fleshed sweetpotato puree, the tannin content shall not exceed 0.3 % by mass on a dry matter basis, when tested in accordance with RS ISO 9648.

9.4.3 If cassava is used as an ingredient of Biofortified orange fleshed sweetpotato puree, the total hydrocyanic acid content shall not exceed 2 mg/kg, when tested in accordance with RS EAS 744.

10 Packaging

Biofortified orange-fleshed sweet potato puree shall be packaged in food grade packaging materials that safeguard the hygienic, nutritional, technological and organoleptic qualities of the produce in accordance with RS CXC 44.

11 Labelling

11.1 General

11.1.1 In addition to the requirements of RS EAS 38; the following labelling requirements shall apply and shall be legibly and indelibly marked:

- a) name of the product as “Biofortified orange fleshed sweetpotato puree”;
- b) name and physical address of the manufacturer /distributor;
- c) net content;
- d) country of origin;
- e) batch number;
- f) date of manufacture;
- g) expiry date;
- h) storage conditions;
- i) instructions on disposal of used package; and
- j) the statement ‘for human consumption’ shall appear on the package;

11.1.2 When labelling non-retail packages, information for non-retail packages shall either be given on the packages or in accompanying documents, except that the name of the product, lot identification and the name and address of the manufacturer or packer shall appear on the packages.

11.2 Nutritional labelling and health claims

11.2.1 Nutritional labelling shall be done in accordance with RS EAS 803.

11.2.2 Nutritional and health claims shall be declared in accordance with RS EAS 804 and RS EAS 805

12 Sampling

Sampling of biofortified orange fleshed sweetpotato puree shall be done in accordance with RS EAS 900.

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Annex A (normative)

Determination of dry matter

A.1 Principle

To determine the dry matter content of puree food, calculate the percentage of water in the puree food and subtract that percentage from 100 %.

A.2 Apparatus

A.2.1 Top pan balance

A.2.2 Analytical balance

A.2.3 Moisture dish

A.2.4 Hot air oven

A.3 Procedure

A.3.1 Weigh an empty moisture dish (M_0). Add approximately 5 g puree food to the moisture dish. Weigh the dish with the test portion before drying (M_1).

A.3.2 Subtract the weight of the empty moisture dish (M_0) from the total weight of moisture dish and test portion before drying (M_1) to get the weight of the test portion before drying. ($M_1 - M_0$)

A.3.3 In a water bath, evaporate the water present in the test portion. Dry the test portion in a hot air oven at 105 °C for 3h - 4 h. Cool the test portion in a desiccator. Weigh the moisture dish and test portion after drying (M_2).

A.4 Calculations

Calculate the dry matter content, expressed as percent, using the following formula:

$$100 - \left(\frac{M_1 - M_2}{M_1 - M_0} \right) \times 100$$

where

M_1 is the weight, in grams of the test portion before drying;

M_2 is the weight, in grams of the test portion after drying;

M_0 is the weight, in grams of the empty moisture dish.

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Bibliography

- [1] FDEAS 1241: 2026 Puree food — Specification
- [2] Baking with Orange-Fleshed Sweetpotato Puree: A Guide for Small-Scale Bakers (CIP, 2013)

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