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Biofortified Orange Fleshed Sweetpotato (OFSP)— Specification

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Foreword

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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 638 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)

University of Rwanda, College of Medicine and Health Sciences (UR-CMHS)

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Introduction

The primary goal of biofortification is to enhance the nutritional quality of staple crops to combat micronutrient deficiencies in populations that rely heavily on these staples for their diet.

Promoting the consumption of micronutrient rich food can contribute to the reduction of micronutrient deficiencies with minimal resource investments. Orange-fleshed Sweetpotato (OFSP) are high in vitamin A content and are known to be acceptable in the communities making it easy to advocate for their uptake.

Most of the sweet potato cultivars are landraces that are white, cream, or purple fleshed with low beta-carotene content. Many OFSP varieties have extremely high levels of bio-available beta-carotene, the precursor to vitamin A. Promoting OFSP is an effective approach for reducing Vitamin A deficiency in African countries.

Orange-fleshed sweetpotato (OFSP) contains high levels of beta-carotene, which is converted by the body into vitamin A. In addition, OFSP contributes significant amounts of vitamins C, E and several B vitamins, as well as dietary fiber, iron and magnesium.

ß-carotene is the carotenoid with the highest provitamin A activity (100%) because it can be entirely converted into two molecules of vitamin A (retinol) (Bechoff, 2010). All-trans-ß-carotene represents about 80-90% of the total carotenoid in OFSP (Bengsston et al. 2008).

In OFSP, initial levels of carotenoids are influenced by variety, root maturation and location (Kósambo et al. 1998).

Biofortified Orange Fleshed Sweetpotato (OFSP) — Specification

1 Scope

This Draft Rwanda Standard specifies requirements, sampling and test methods for biofortified Orange Fleshed Sweetpotato, OFSP (*Ipomoea batatas* (L.) 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*

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 ISO 874, *Fresh fruits and vegetables — Sampling*

3 Terms and definitions

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

3.1

sweet potato

roots obtained from a plant of the *Ipomoea batatas* (L.) Lam

3.2

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

3.3

firm

not soft, shrivelled or flabby

3.4

sound/wholesome

free from disease, serious deterioration (such as but not limited to decay, breakdown, freezing damage, or soft or shrivelled specimens) or adulteration/contamination, that appreciably affects their appearance, edibility, keeping quality or market value.

3.5

practically free

produce without defects in excess of those that can be expected to result from, and be consistent with good agronomical and handling practices employed in the production and marketing

3.6

clean

practically free from dirt or staining or other foreign matter or extraneous matter

3.7

extraneous matter

organic matter of plant origin other than the orange fleshed sweet potato

3.8

foreign matter

organic and inorganic materials (such as sand, soil and glass) other than extraneous matter in the orange fleshed sweet potato

3.9

superficial defects

superficial defects on sweetpotato roots refer to minor, surface-level imperfections that affect the skin or outer flesh but do not penetrate deeply into the tuber or impact its internal quality significantly. These are defects you can see on the outside, but when the root is peeled or cut, the inside remains sound and usable.

4 Requirements

4.1 Classification

4.1.1 Types of classes

4.1.1.1 Biofortified Orange Fleshed Sweetpotato (OFSP) shall be classified.

4.1.1.2 The following classes shall be used in accordance with the requirements of each class

a) extra class;

b) class I; and

c) class II.

4.1.2 Class requirements

4.1.2.1 Extra class

4.1.2.1.1 Biofortified Orange fleshed Sweetpotato (OFSP) shall comply with the following requirements and shall be:

a) of superior quality in terms of texture and appearance; and

b) uniform in shape and size, characteristic of the variety.

4.1.2.1.2 Biofortified Orange fleshed Sweetpotato (OFSP) shall be free from defects, with the exception of superficial defects on the surface affecting not more than 2 % of the fresh OFSP.

4.1.2.1.3 The following tolerances shall be allowed:

a) For this class, 5 % by weight ofBiofortified Orange-fleshed Sweetpotato (OFSP) not satisfying the requirements of extra class, but meeting those of class I or exceptionally, coming within the tolerances of class I shall be tolerated

b) not more than 3 % of the Biofortified Orange-fleshed Sweetpotato (OFSP) may be affected by damage caused by pests; and

c) not more than 3 % of the Biofortified Orange-fleshed Sweetpotato (OFSP) may be affected by rot, mould or deterioration; and damage caused by pests in combination

4.1.2.2 Class I

4.1.2.2.1 Biofortified Orange-fleshed Sweetpotato (OFSP) shall comply with the following requirements and shall be:

a) of good quality; and

b) uniform in shape and size, characteristic of the variety.

4.1.2.2.2 The following slight defects may be allowed, provided these do not affect the general appearance of the produce, quality, keeping quality/storage stability and presentation of the Biofortified Orangefleshed Sweetpotato (OFSP):

a) defects in shape not exceeding 5 % of the fresh OFSP;

b) bruising, not exceeding 10 % of the surface area of the fresh OFSP;

c) scraped areas, not exceeding 20 % of the surface area of the fresh OFSP; and

d) scarred and healed damage, not exceeding 5 % of the surface area of the fresh OFSP.

4.1.2.2.3 The following tolerances shall be allowed:

a) For this class, 10 % by weight of Biofortified Orange fleshed Sweetpotato (OFSP) not satisfying the requirements of class I, but meeting those of class II or exceptionally, coming within the tolerances of class II.

b) not more than 3 % of the Biofortified Orange fleshed Sweetpotato (OFSP) may be affected by damage caused by pests; and

c) not more than 3 % of the Biofortified Orange-fleshed Sweetpotato (OFSP) may be affected by rot, mould or deterioration; and damage caused by pests in combination

4.1.2.3 Class II

4.1.2.3.1 Biofortified Orange-fleshed Sweetpotato (OFSP) shall comply with the following requirements, but shall not qualify for inclusion in the higher classes.

4.1.2.3.2 The following defects may be allowed:

a) defects in shape not exceeding 10 % of fresh OFSP;

b) bruising, not exceeding 20 % of the surface area of the fresh OFSP;

c) scraped areas, not exceeding 30 % of the surface area of the fresh OFSP; and

d) scarred and healed damage, not exceeding 10 % of the surface area of the fresh OFSP.

4.1.2.3.3 The following tolerances shall be allowed:

a) For this class, 10 % by weight of Biofortified Orange-fleshed Sweetpotato (OFSP) not satisfying the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering them unfit for human consumption

b) not more than 3 % of the Bio fortifiedBiofortified Orange-fleshed Sweetpotato (OFSP) may be affected by damage caused by pests; and

c) not more than 3 % of the Bio fortifiedBiofortified Orange-fleshed Sweetpotato (OFSP) may be affected by rot, mould or deterioration; and damage caused by pests in combination

4.2 General requirements

4.2.1 Biofortified Orange Fleshed Sweetpotato (OFSP) shall be:

d) firm;

e) fresh;

f) wholesome/sound;

g) not affected by rot, mould or deterioration as to make it unfit for consumption;

h) clean, and practically free of any visible extraneous matter or foreign matter, except permitted substances used to prolong its shelf life;

i) of colour, taste and texture characteristic of the variety;

j) free from pests, and damage caused by pests;

k) free from excess external moisture, adequately surface dried if they have been washed;

l) free from any foreign smell and/or taste with exception of preservation agents

m) practically free from mechanical damage; and

n) free from greening.

4.2.2 Biofortified Orange Fleshed Sweetpotato (OFSP) shall be carefully harvested after reaching an appropriate degree of physiological maturity taking into account the characteristics of the variety and the area in which it is grown. The development and conditions of the fresh OFSP shall be such as to enable it to:

a) withstand recommended transportation and handling conditions; and

b) arrive in a satisfactory condition at the place of destination

5 Sizing

5.1 General

Biofortified Orange Fleshed Sweetpotato (OFSP) shall be designated by size in accordance with Table 1. The size shall be determined by weight.

Table 1 — Size codes for Biofortified Orange Fleshed Sweetpotato (OFSP)

Size code	Size	Weight g
A	Large	> 650
B	Medium	450 - 650
C	Small	< 450

5.2 Size tolerances

For all classes, 10 % by number or weight of Biofortified Orange-fleshed Sweetpotato (OFSP) corresponding to the size immediately above and/or below that is indicated on the package.

6 Specific requirements

Biofortified Orange-fleshed Sweetpotato (OFSP) shall be classified and have Beta-carotene (provitamin A) content given in table 2 when tested in accordance with the test method specified therein.

Table 2 — Levels of Beta-carotene (provitamin A) in OFSP

S/N	Micronutrients	Requirement	Test method
i.	Beta-carotene (provitamin A), mg/100g, min.	3	AOAC 2016.13

7 Food additives

Food additives when used shall comply with RS CXS 192.

8 Hygiene

Biofortified Orange-fleshed Sweetpotato (OFSP) shall be handled in accordance with RS CXC 53.

9 Contaminants

9.1 Heavy metals

Heavy metals in Biofortified Orange-fleshed Sweetpotato (OFSP) shall not exceed the limits given in CXS 193.

9.2 Pesticide residues

Biofortified Orange-fleshed Sweetpotato (OFSP) shall comply with the maximum pesticide residue limits established by the Codex Alimentarius Commission.

10 Packaging

Biofortified Orange-fleshed Sweetpotato (OFSP) shall be packaged in food grade packaging materials that will 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 given in RS EAS 38, the produce shall be legibly and indelibly labelled with the following information:

a) name of the produce as “Biofortified Orange-fleshed Sweetpotato”;

b) name and physical address of the producer, packer or distributor;

c) micronutrient content eg. Beta-carotene (provitamin A)

d) country of origin;

e) class

f) variety;

g) size/size code, where applicable;

h) net weight (in metric units);

i) lot identification (batch number);

j) preservatives, when used;

k) date of harvest;

l) packing date;

m) storage conditions; and

n) indication “For human consumption”.

11.1.2 When labelling non-retail packages, information 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 packer shall appear on the package.

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 shall be done in accordance with RS ISO 874.

Annex A
(informative)

Recommended Nutrient Intakes (RNI) for various age groups

Table A.1— Vitamins

Group	Thiamine (Vit.B1) mg/day	Riboflavin (Vit. B2) mg/day	Niacin (Vit. B3) mg/day	Pantothenic acid (Vit. B5) mg/day	Pyridoxine (Vit. B6) mg/day	Folic acid (Vit. B9) mcg/day	Cynocobalamin(Vit. B12) mcg/day	Biotin mcg/day	Vitamin A mcg RE/day	Vitamin C mg/day	Vitamin D mcg/day	Vitamin E mg/day	Vitamin K mcg/day
Infants													
0-6 month	0.2	0.3	2	1.7	0.1	80	0.4	5.0	375	25	5	2.7	5
7-12 month	0.3	0.4	4	1.8	0.3	80	0.5	6.0	400	30	5	2.7	10
Children													
1-3 years	0.5	0.5	6	2.0	0.5	160	0.9	8.0	400	30	5	5	15
4-6 years	0.6	0.6	8	3.0	0.6	200	1.2	120	450	30	5	5	20
7-9 years	0.9	0.9	12	4.0	1.0	300	1.8	200	500	35	5	7	25
Adolescents													
Females 10-18 years	1.1	1.0	16	5.0	1.2	400	2.4	25.0	600	40	5	7.5	35-55
Males 10-18 years	1.2	1.3	16	5.0	1.3	400	2.4	25.0	600	40	5	10	35-55
Adults													
Females 19+ years	1.1	1.1	14	5.0	1.3 *(19-50yrs)* 1.5 *(>50yrs)*	400	2.4	30.0	500 *(19-65yrs)* 600 *(65+ yrs)*	45	5 *(19-50yrs)* 10 *(51-65yrs)* 15 *(65+yrs)*	7.5	55
Males 19+ years	1.2	1.3	16	5.0	1.3 1.7	400	2.4	30.0	600	45	5 *(19-50yrs)* 10 *(51-65yrs)*	10	65

(Reference: Guideline for Evaluation of Food Supplement - May 2019 of Rwanda FDA)

Bibliography

[1] RS EAS 771: 2023, Fresh sweet potato — Specification

[2] Bechoff, A. 2010. Investigating carotenoid loss after drying and storage of orange-fleshed sweetpotato. PhD thesis. University of Greenwich. UK. 330pp.

[3] Bengtsson, A., A. Namutebi, M.L. Alminger and U. Svanberg 2008. Effects of various traditional processing methods on the all-trans-b-carotene content of orangefleshed sweet potato. Journal of Food Composition and Analysis 21: 134-143.

[4] Kósambo L., E.E. Carey, A.K. Misra, J. Wilkes and V. Hagenimana 1998. Influence of age, farming site, and boiling on pro-vitamin A content in sweet potato (Ipomoea batatas (L.) Lam.). Journal of Food Analysis 11: 305-321.

[5] Uganda-country-report_web_08.08_0.pdf

[6] Guideline for Evaluation of Food Supplement - May 2019 of Rwanda FDA

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