

**DRAFT TANZANIA STANDARD**

---

**Orange fleshed sweet potato flour — Specification**

*Draft for Comments Only*

**TANZANIA BUREAU OF STANDARDS**

---

## 0. Foreword

Orange fleshed sweet potato (*Ipomoea batatas* L.) flour is a product produced by grinding dried orange fleshed sweet potato into flour to sustain the promising source of pro-vitamin A from the cultivars. The demand for this product is increasing thus the need to ensure the safety and quality of orange fleshed sweet potato flour produced and/or marketed for local consumption and export market.

In developing this standard assistance was drawn from stakeholders who provided necessary information and samples.

In reporting the result of a test or analysis made in accordance with this standard, if the final value observed or calculated, is to be rounded off, it shall be done in accordance with TZS 4 (See clause 2).

## 1 Scope

This Tanzania standard prescribes requirements, sampling and test methods for orange fleshed sweet potato flour intended for human consumption.

## 2 Normative references

The following referenced documents are indispensable for the application 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.

TZS 4, Rounding off numerical values

TZS 109, Food Processing units- Code of hygiene

TZS 122-1 (ISO 6579-1), Microbiology of the food chain — Horizontal method for the detection, enumeration and serotyping of *Salmonella*- Part 1: Detection of *Salmonella* spp

TZS 330 (EAS 900), Cereals and Pulses – Sampling

TZS 538 (EAS 38), Labelling of pre-packaged foods — General requirements

TZS 731 (ISO 7251)- Microbiology of food and animal feeding stuffs- Horizontal method for the detection and enumeration of presumptive *Escherichia coli*- Most probable number technique

TZS 961 (1st Ed), Starch – Determination of moisture content – Oven-drying method

TZS 1581-2, Determination of cadmium content – Method flame atomic absorption spectrometry

TZS 2044 (ISO 5985), Animal feeding stuffs – Determination of ash insoluble in hydrochloric

TZS 2426-1 (ISO 21527-1)- Microbiology of food and animal feeding stuffs - Horizontal method for the enumeration of yeasts and moulds - Part 1: Colony count technique in products with water activity greater than 0.95

FTZS 2473, Animal feeding stuffs - Determination of crude ash

TZS 2565, Bio fortified sweet potato – Specification

### 3 Terms and definitions

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

#### 3.1

##### **orange fleshed sweet potato**

storage roots biofortified with beta-carotene (provitamin A) obtained from a plant of the species (*Ipomoea batatas* (L.) Lam), primarily used for human consumption

#### 3.2

##### **orange fleshed sweet potato flour**

flour obtained from sweet potato as defined under 3.1

#### 3.3

##### **foreign matter**

inorganic matter such as sand, glass, metal, stones, clay, mud and organic matter such as chaff, straw, weed seeds, live insects, insect fragments and rodent hairs

#### 3.4

##### **food grade material**

material that will not transfer non-food chemicals into the food and contains no chemicals which would be hazardous to human health

### 4 Requirements

#### 4.1 General requirements

4.1.1 Orange fleshed sweet potato flour shall be produced from orange fleshed sweet potato complying to TZS 2565.

4.1.2 Orange fleshed sweet potato flour shall be

- a) uniformly orange in colour,
- b) free from off-flavours and odours;
- c) practically free from any living insects and foreign matters

#### 4.2 Specific requirements

4.2.1 Orange fleshed sweet potato flour shall conform to the compositional quality requirements shown in Table 1.

**Table 1 — Specific requirements for orange fleshed sweet potato flour**

S/NO	Analytical characteristic	Limits	Method of test
1.	Moisture, % by mass, max	12	TZS 961
2.	Ash content, %, by mass, min.	2	FTZS 2473
3.	Carotenoids, mg/100g, min	3.2	Annex A

4.	Crude fibre, % by mass on dry weight basis, max	3	ISO 5498
5.	Acid insoluble ash, % by mass, max.	0.15	TZS 2044

4.2.2 For particle size, not less than 95 % of mass of orange fleshed sweet potato flour shall pass through a sieve of 140-µm mesh screen.

## 5 Hygiene

Orange fleshed sweet potato flour shall be prepared and handled in a hygienic manner in accordance with TZS 109 and shall conform to microbiological limits specified in Table 2.

**Table 2 — Microbiological limits for orange fleshed sweet potato flour**

S/NO	Micro-organisms	Maximum limit	Method of Test
1.	<i>Escherichia coli</i> , cfu/g,	Absent	TZS 731
2.	<i>Salmonella spp</i> , per 25g	Absent	TZS 122-1
3.	Yeast and mould, cfu/g,.	10 <sup>3</sup>	TZS 2426-1

## 6 Contaminants

### 6.1 Heavy metals contaminants

Orange fleshed sweet potato flour shall not contain any metal contaminants in excess of levels specified in Table 3.

**Table 3 – Limit for heavy metals contaminants for orange fleshed sweet potato flour**

S/NO	Characteristics	Maximum (mg/kg)	Method of Test
1.	Lead (Pb)	0.1	TZS 1502
2.	Cadmium (Cd)	0.1	TZS 1581-2

### 6.2 Pesticide residues

Orange fleshed sweet potato flour shall conform to maximum residue limits for pesticide residues established by the Codex Alimentarius Commission for this commodity.

### 6.3 Aflatoxin

Orange fleshed sweet potato flour shall not have more than 5 ppb for Aflatoxin B<sub>1</sub> and 10 ppb for total aflatoxin when tested according to TZS 799.

## 7 Packing, marking and labelling

### 7.1 Packing

Orange fleshed sweet potato flour shall be packed in suitable food grade materials,

### 7.2 Marking and labelling

In addition to the requirements of TZS 538; the following labeling requirements shall apply and shall be legibly and indelibly marked

- a) the common name of the food product to be declared on the label shall be 'orange fleshed sweet potato flour';
- b) the net weight the name and physical address of the manufacturer / distributor;
- c) the country of origin;
- d) batch number;
- e) date of manufacture and expiry date
- f) storage conditions
- g) instructions on disposal of used package
- h) The language on the label shall be Swahili and/or English". Another language may be used depending on the designated market.

## 8 Sampling and tests

### 8.1 Sampling

Sampling of orange fleshed sweet potato flour shall be done according to TZS 330.

### 8.2 Tests

Testing of orange fleshed sweet potato flour shall be done according to test methods prescribed in Table 1,2,3 and Annex A of this standard.

NOTE: The TBS Standards Mark of Quality may be used by the manufacturers only under license from TBS. Particulars of conditions under which the license are granted may be obtained from TBS

## ANNEX A (Normative)

### DETERMINATION OF BETA CAROTENE IN FOOD BY UV-VIS SPECTROPHOTOMETRIC METHOD

#### A. Principle

This method is based on solvent extraction followed by UV-Vis spectrometric detection. The sample is extracted using Acetone, filtered and the filtrate extracted using Petroleum ether, then the concentration of  $\beta$ -carotene is determined by reading the absorbance of standard and sample extract using petroleum ether as blank at 450nm using UV-Visible spectrophotometer.

#### B. Reagents and Apparatus

- a) *Acetone, AR grade 99.5% purity*
- b) *Anhydrous Sodium Sulphate*
- c)  *$\beta$ -Carotene standard  $\geq 93\%$  (UV), powder.*
- d) *Petroleum Ether, Spectrophotometric grade*
- e) *Distilled water*
- f) *UV-Visible spectrophotometer*
- g) *Blender*
- h) *100 ml Volumetric flask*
- i) *100ml Beaker*
- j) *100 ml Measuring cylinder*

#### C. Extraction

Grind sample if it is in grains or pellets form and make sure almost 95% the powder can pass through 1mm sieve. Weigh 0.2-1.0 g of homogenized test portion into blender, then Add 50mls of cold acetone and mix/mill to extract for about 10 minutes.

Filter the sample using whatman filter paper No. 1 to obtain clear filtrate. Wash the residue on the filter paper three times or more until the residuals are white (free from carotenoids).

Transfer the carotenoids extract into separating funnels containing 50ml of petroleum ether and 25 ml of distilled water, and extract by shaking the funnel for about five minutes, then wash the extract using 60mls portions of distilled water until it is free from acetone.

Prepare volumetric flask and glass funnel containing anhydrous dry Sodium Sulphate, pass the carotenoids extract through anhydrous Sodium Sulphate to dry it. Rinse the separating flask, Sodium Sulphate and funnel using petroleum ether but taking care not to exceed the mark of the volumetric flask.

#### D. Determination

Prepare 100 $\mu$ g/ml working standard solution from stock  $\beta$ -carotene standard, then prepare calibration standards by diluting it serially to obtain 0, 2, 4, 8, 16, 32, 64 $\mu$ g/ml beta carotene by taking appropriate volume of working standard solution into volumetric flask and diluting it with petroleum ether into 100ml volumetric flask.

Read the absorbance of standards and sample extract using petroleum ether as blank at 450nm using UV-Visible spectrophotometer. Use standard concentrations and the obtained absorbance to construct a

standard calibration curve, from the curve obtain equation and calculate the beta carotene concentration in the samples

**Calculation**

$$\beta - \text{Carotene concentration } (\mu\text{g/ml or } \mu\text{g/g}) = \frac{(A \pm K) \times V_1}{M \times \text{Sp wt}}$$

where

- A = Sample absorbance
- K = Y-intercept of the standard calibration curve
- V<sub>1</sub> = Total volume of the sample extract
- M = Slope of the standard plot
- Sp wt. = Amount of sample taken for analysis

Draft for Comments Only