CASSAVA AND
DERIVED PRODUCTS

ARS GAPM 25:2018
Good Agricultural Practices Outreach Information for
African Standards on Fresh Cassava and Derived Products

Based on ARS 835-2016 Fresh sweet cassava Specification
ARS 836-2016 Fresh bitter cassava Specification
ARS 837-2016 Fresh cassava leaves Specification
ARS 838-2016 Cassava flour Specification
ARS 839-2016 Dried cassava chips Specification
ARS 840-2016 High quality cassava flour Specification
ARS 843-2016 Cassava crisps Specification
ARS 844-2016 Cassava and cassava products Determination of total
cyanogens Enzymatic assay method
ARS 845-2016 Production and handling of fresh cassava Code of practice
ARS 846-2016 Food grade cassava starch Specification
ARS 853-2016 Cassava bread Specification
The African Organization for Standardization (ARSO) is an African intergovernmental organization established by the United Nations Economic Commission for Africa (UNECA) and the Organization of African Unity (AU) in 1977. One of the fundamental mandates of ARSO is to develop and harmonize African Standards (ARS) for the purpose of enhancing Africa’s internal trading capacity, increase Africa’s product and service competitiveness globally and uplift the welfare of African communities. The work of preparing African Standards is normally carried out through ARSO technical committees. Each Member State interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, Regional Economic Communities (RECs), governmental and non-governmental organizations, in liaison with ARSO, also take part in the work.
ACKNOWLEDGEMENT

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INTRODUCTION

Cassava, (Manihot esculenta Crantz) is the third most important food crop in the tropics after rice and maize, and is consumed daily by up to one billion people, mostly in Africa. Global cassava output in 2011 was expected to rise by over 6% from the previous year (2010), and to surpass 250 million metric tons for the first time (FAO, 2011). Cassava is also replacing major traditional staples such as maize, finger millet, bananas, and plantains, because the productivity of these traditional staples have been declining as a result of deteriorating soil fertility and the adverse effects of climate change. Cassava on the other hand thrives in harsh conditions, and produces its carbohydrate-rich roots in poor soils, even in times of drought. Cassava is cultivated in around 40 African countries, stretching through a wide belt from Madagascar in the Southeast to Senegal and to Cape Verde in the Northwest. It is known to be the highest producer of carbohydrates among staple crops.

The rapid increases in cassava production has significant implications for the food, nutrition and energy security of Africa’s rapidly rising urban population, which will increase from 414 million to over 1.2 billion by 2050 (UN, 2012). Despite enormous production challenges, at least 60% of global cassava production is projected to come from Africa, with significant potential to reduce the food gap, increase farm incomes in the rural areas, and reduce rural and urban food, nutrition and energy insecurity and poverty (Otim-Nape et al., 2008). Cassava can be used as; cassava flour for making bread, biscuits, pastries and snack foods, it can also be used as feeds to livestock. Cassava roots and leaves may be combined in a ratio of four to one, the mixture could replace maize in poultry feed and reduce feed cost without a loss in weight gain or egg production (Tewe and Bokanga, 2001).

This Good Agriculture Practices Outreach Information for African Standards on Fresh Cassava and Derived Products is aimed at simplifying the technical nature of African cassava standards listed below:

1. ARS 835-2016 Fresh sweet cassava Specification
2. ARS 836-2016 Fresh bitter cassava Specification
3. ARS 837-2016 Fresh cassava leaves Specification
4. ARS 838-2016 Cassava flour Specification
5. ARS 839-2016 Dried cassava chips Specification
6. ARS 840-2016 High quality cassava flour Specification
7. ARS 843-2016 Cassava crisps Specification
8. ARS 844-2016 Cassava and cassava products Determination of total cyanogens Enzymatic assay method
9. ARS 845-2016 Production and handling of fresh cassava Code of practice
10. ARS 846-2016 Food grade cassava starch Specification
11. ARS 853-2016 Cassava bread Specification
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CROP HUSBANDRY
CASSAVA CROP HUSBANDRY

Cassava is a perennial plant that has two types “Bitter” and “sweet”. The sweet type is more commonly grown because of its greater yields.

Cassava is propagated by stem cuttings. These cuttings must be handled properly for good sprouting and establishment.

CLIMATIC REQUIREMENTS

Cassava crop requires a warm, humid climate. Temperature is important grown in areas that are frost-free all year round. The highest tuber production can be expected in the tropical lowlands, below an altitude of 150 m, where temperatures average 25 °C and 29 °C, but some varieties grow at altitudes of up to 1,500 m. Cassava can be grown where the annual rainfall is as low as 500 mm but well-distributed and where it is as high as 5,000 mm. It can be able to withstand prolonged drought.
CASSAVA CROP MANAGEMENT

Avoid stony, clayey or water-logged soils. Till the land identified for planting cassava cuttings. Tillage loosens and aerates the soil, and mixes organic matter and nutrients fairly evenly; roots can penetrate more deeply and plants are established better.

In shallow or hard soils, make ridges or mounds to increase the topsoil volume per plant for a better establishment.

Intercropping cassava and other crops such as with maize, legumes, vegetables. Intercrops such as legumes improve soil properties as they release nutrients into the soil. It may also help cover the soil and weeds will find difficult growing.

GENERAL REQUIREMENTS

PLANTING LOCATION

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water sources</td>
<td>Water for growing cassava shall be from source that is environmentally safe from hazardous contaminant.</td>
<td>Inspect the surroundings. If there is any risk, verify the water quality.</td>
</tr>
</tbody>
</table>

WATER SOURCES: DO NOT USE HAZARDOUS OR CONTAMINANT WATER
### TYPES OF PINEAPPLES

**Item** | **Requirement** | **Inspection**
---|---|---
Farm topography | The land shall be flat or has a gentle slope, with deep well-drained loamy soil, which is not likely to be flooded or waterlogged. | Inspect the surroundings. If there is any risk, verify the water quality.

If the cassava farm land is exposed to any risk of industrial waste/ dumping or heavy use of chemicals

**WATER SOURCES / FARM CONTAMINATION:** CONTAMINATED WATER SOURCE, SAMPLES OF THE SOIL AND WATER SHALL BE COLLECTED FOR APPROPRIATE ANALYSIS.

**LAND CONTAMINATED BY OIL SPILLAGE:** SHALL NOT BE CONSIDERED FOR CASSAVA PRODUCTION.
SELECTION AND SOIL PREPARATION

Identifying and selecting the field to grow cassava is quite important in preventing diseases and pests. Having information such as how the land was previously used, and the types of weeds, diseases, and pests in the area, can help you in selecting a site for your cassava farm. Such information can help you to avoid a site with problems or make good plans for plant protection.

Soil Condition: Avoid water-logged soil.

USE OF PESTICIDES

<table>
<thead>
<tr>
<th>Item</th>
<th>Requirement</th>
<th>Inspection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application of pesticides</td>
<td>- Registered pesticide shall be used. Appropriate method and time of application of the recommended combination shall be observed, recorded and approved by relevant authority.</td>
<td>- Check the record of pesticide application.</td>
</tr>
<tr>
<td></td>
<td>- Pesticides shall not be stored in the same room with rice grains or fertilisers. Pesticides shall be stored in ventilated areas not exposed to direct sunlight in a clean and dry area slightly elevated above ground</td>
<td>- Inspect the storage of the pesticides.</td>
</tr>
<tr>
<td></td>
<td>- Storage area of pesticides shall be isolated from rice drying and storage areas to prevent contamination due to leaching, runoff or wind drift</td>
<td>- If evidence or situation is in doubt of misapplication of pesticide, the produce shall be analyzed for pesticide residues.</td>
</tr>
</tbody>
</table>
APPLICATION OF PESTICIDES: REGISTERED PESTICIDE SHALL BE USED

APPLICATION OF PESTICIDES: ONLY PESTICIDES IN CONTAINERS THAT HAVE PROPER LABELS WITH PERTINENT INFORMATION ON ACTIVE INGREDIENT, SAFE APPLICATION RATE, AND MAMMALIAN TOXICITY SHALL BE USED
## USE OF PESTICIDES AND OTHER AGROCHEMICALS

<table>
<thead>
<tr>
<th>DATE OF TRAINING</th>
<th>TARGET</th>
<th>TOPICS</th>
<th>AIM</th>
</tr>
</thead>
<tbody>
<tr>
<td>25/01/2018</td>
<td>Farmers</td>
<td>safe handling and proper application procedures for maximum efficacy of pesticides</td>
<td>to prevent immediate and subsequent potential hazards both to the operator, crop, non-hazardous organisms and environments,</td>
</tr>
<tr>
<td>26/01/2018</td>
<td>Farm workers</td>
<td>Precautions on Use of pesticides</td>
<td>Knowledge on conduct of workers with respect to complete protective wears (over-all, mask, hand gloves head gear or cap and boots.), abstinence from eating, drinking and smoking pesticide handling</td>
</tr>
<tr>
<td>28/01/2018</td>
<td>Extension officers/Farm workers</td>
<td>sprayer calibration</td>
<td>to facilitate correct and safe delivery of pesticides, proper method of handling and regular maintenance of application equipment for hitch-free use, prevention of contamination of the environment through responsible disposal of excess and wash-out chemicals and their packaging containers.</td>
</tr>
<tr>
<td>29/01/2018</td>
<td>Farm workers</td>
<td>use of equipment</td>
<td>that are in good working condition and appropriate personal protective materials via mask, gloves, overall and rain boots is mandatory for the health of the operator</td>
</tr>
</tbody>
</table>
TYPES OF PINEAPPLES
PRE - HARVEST PRODUCTION
PRE-HARVEST PRODUCTION

LAND PREPARATION

Good land preparation is very essential for early weed control in crop life, good establishment, growth and development, hence enhanced productivity of cassava. The first tillage operation shall take place at 14 days after slashing or herbicide. The type of tillage operation depends on the system and scale: hoe-farming or mechanized. Mechanized tillage shall include ploughing followed by harrowing at 10 to 14 days later.
SOIL FERTILITY

Sources of nutrient supply to boost the growth and development of the crop at the critical stages as well as stem and quality root tuber production.

SOIL AND SOIL NUTRIENTS: SOIL SAMPLES SHALL BE ANALYSED FOR HEAVY METALS, PH AND PESTICIDES RESIDUES

FERTILIZERS: SHALL BE APPLIED AT THE RATES RECOMMENDED BY THE APPROPRIATE EXTENSION/TECHNICAL AGENCY
STEM CUTTINGS SELECTION

Visual inspection and check the record on the sources of stem cuttings.

Cassava stem cuttings shall have 5–7 nodes.

Cassava stem cuttings shall be collected from the central part of cassava plants.

Store under the shade for 2–5 days (not more than 2 weeks) before cutting and planting. This makes the stems sprout faster than when they are planted freshly cut from the field.

Stems should be stored vertically on the soil under a shade. The distal end of the stems should touch the soil, which is moistened regularly, with the surroundings kept free from weeds.

Handle the stems with care not to destroy the nodes that may result in losses. Do not make sharp cut surfaces or keep stems in the open (leading to drying).
PLANTING CASSAVA CUTTINGS (SEEDS)

Cassava cuttings can be planted in either slanting or angular position. In the angular position, the cuttings are buried in the soil with one-third above the soil surface. The slanting position the whole cassava cutting is horizontally buried to the soil. At either position ensure that the buds point upwards. This is where the cuttings sprout.

hill soil measuring 1m by 1m for cassava spacing.

The stem cutting shall be planted on the same day or kept under shade for a period of not more than 5 days after cutting before planting. For longer storage period the base of the stem shall continuously touch moist soil that is kept weed free.

PEST CONTROL

WEED CONTROL

Weeds are controlled so that cassava grows and develops well.

Weeds cause serious growth to cassava that if not managed well will reduce yield and quality of cassava. Cultural weed control shall include the rotation and intercrop of other crops.

CULTURAL WEED CONTROL SHALL INCLUDE THE ROTATION AND INTERCROP OF OTHER CROPS
Three methods available to control weeds.

1. Manual shall involve three to four hoe-weeding at 3 to 4, 6 to 8, 12 to 16 and 24
2. Mechanically
3. Chemically - herbicides shall be applied pre-emergence at not more than two days after planting

**INSECT PEST CONTROL**

Weeds are controlled so that cassava grows and develops well.

Weeds cause serious growth to cassava that if not managed well will reduce yield and quality of cassava. Cultural weed control shall include the rotation and intercrop of other crops.

Infestation of cassava by insect pests could be devastating and therefore should be promptly controlled.

The adverse effects caused include:

- Defoliation through chewing of leaves, petioles, green stem and bark of stems (Variagated locust/cricket-Zonocerus variegatus). Sucking sap from the plants and inducing various symptoms viz.
- Small yellow spots on the upper parts of leaves, dieback of leaves and candle stick appearance due to terminal shoot shredding, hence death (green mite-Monorychedus)
- Shortened internodes, leaf and stem distortion, giving a bushy appearance, wilting and defoliation of leaves (Cassava mealybug-Phenococcus manihot + development of sooty mould on the plant, promoted by the honey dew secreted by the insect; blackening and death of leaves (White fly-Aleurodicus dispersus).

The recommended control methods include crop rotation, farm sanitation, early planting of healthy pest-free stem cuttings in the rainy season, use of varieties that are tolerant/resistant to the prevalent insect pests at the site as well as insecticides, both as spray and/or bait.

**CASSAVA DISEASES AND PESTS**

The common stem-borne cassava pests and diseases are cassava mealybug, cassava green mite, spiraling white-fly, white scale insect, cassava mosaic disease cassava bacterial blight, cassava anthracnose disease, and cassava bud necrosis.

Control of diseases, resistant/tolerant varieties with cuttings from clean field shall be planted and practice integrated pest managements (IPM). Also insecticides to control vectors e.g. cassava mealybug, while cassava mealybug and white fly shall be applied in addition early planting of cassava in the season could reduce disease problem.

Use of resistant/tolerant varieties and virus-free planting material are key for the control of cassava disease.
TYPES OF PINEAPPLES

INFECTED CASSAVA LEAF

CITRUS-MEALYBUG-DISEASE
INFECTED CASSAVA LEAF

INFECTED PARTS ON BASE OF CASSAVA STEMS
HARVEST
HARVEST

Early varieties mature at 6 to 8 MAP while the late varieties mature at 12 to 19 MAP.

Tuber harvesting shall

1. involve cutting the stems at a height of 25 cm to 30 cm above the ground using cutlass
2. pull out the roots carefully with hands on a light soil or hand-hoe for uprooting in slightly heavy

TRANSPORT

Freshly harvested cassava root tubers must arrive at the collection centre within 2 days and processed within 3 days.

STORAGE OF CASSAVA ROOTS AND STEMS

Harvested cassava roots cannot be stored for long since they start to reduce in quality 2 to 3 days after harvest.

Ref: ARS 886:2018, Fresh Pineapple — Specification
(1) See Clause 9 Contaminants
Harvest only as need arises in order to reduce wastage. Store fresh roots in the ground or in moist sawdust or dip in water, and then pack in polysack fitted into a wet cocoa sack and tie the bag tightly. Also store peeled roots in a polythene bag and then in a refrigerator.

**WORKERS HEALTH, SAFETY AND WELFARE**

FIRST AID: THE FARM SHALL HAVE A FIRST AID BOX WHICH IS ADEQUATELY STOCKED ON THE ADVICE OF HEALTH CARE PERSONNEL.

WORKERS WHO HANDLE PESTICIDES: SHALL FOLLOW ALL THE PRECAUTIONS WITH RESPECT TO PROTECTIVE WEAR AND ABSTINENCE FROM FEEDING, DRINKING AND SMOKING DURING HANDLING.
GENERAL & SPECIFIC REQUIREMENTS
GENERAL & SPECIFIC REQUIREMENTS

FRESH CASSAVA (BITTER AND SWEET) SPECIFICATION

GENERAL REQUIREMENTS
The bitter cassava roots shall have been carefully harvested. Cassava roots should be carefully harvested after reaching maturity as to enable it to withstand normal transport and handling conditions, and arrive in a satisfactory condition at the place of destination.

SPECIFIC REQUIREMENTS
In all classes, subject to the special provisions for each class and the tolerances allowed, the cassava roots shall be:

1. wholesome/sound
2. fresh, clean, whole and firm
3. skin color shall be free from flesh discoloration
4. free of pests affecting the general appearance of the produce;
5. free of damage caused by pests and diseases;
6. free of abnormal external moisture,
7. free of loss of color in the flesh;
8. free of any foreign smell and/or taste with exception of preservation agents allowed; and
9. free of mechanical damage and bruising.

CLASSIFICATION
When tested for hydrogen cyanide, those that have no more than 10 mg/kg, shall be classified as sweet cassava, those having more than 10 mg/kg of hydrogen cyanide shall be classified as bitter cassava.
EXTRA CLASS
Cassava in this class must be of superior quality in terms of taste, texture, skin and flesh color. The characteristic of the variety and/or commercial type, shall be uniform in shape, quality and size.

EXTRA CLASS: SHALL BE FREE FROM DEFECTS

EXTRA CLASS: SLIGHT SUPERFICIAL DEFECTS, AFFECTING NOT MORE THAN 2 % OF THE CASSAVA ROOTS.
CLASS I

CLASS I: SLIGHT SHAPE DEFECTS, <= 5% OF THE ROOTS, BRUIsing <= 10%

CLASS I: SCRAPED AREAS <= 20 % OF THE SURFACE AREA CASSAVA ROOTS, SCARRED & HEALED DAMAGED <= 5% OF THE SURFACE AREA CASSAVA ROOTS.
CLASS II

CLASS II: DEFECTS IN SHAPE NOT EXCEEDING 10\% OF THE ROOTS; BRUISING, NOT EXCEEDING 20\% OF THE SURFACE AREA OF ROOTS

CLASS II: SCRAPED AREAS, NOT EXCEEDING 30\% OF THE SURFACE AREA OF ROOTS. SCARRED AND HEALED DAMAGE, NOT EXCEEDING 10\% OF THE SURFACE AREA OF THE ROOTS. THE DEFECTS SHALL NOT, IN ANY CASE, AFFECT THE PULP OF THE PRODUCE
SIZE REQUIREMENTS

In all cases, cassava shall not be less than 300 g in weight nor less than 20 cm in length. Size shall be determined by measuring the diameter at the thickest cross-section of the root.

Size tolerances for all classes shall be a maximum of 10 % by number of the weight of cassava corresponding to the size immediately above or below the size declared or indicated on the package.

<table>
<thead>
<tr>
<th>Size Code</th>
<th>Size</th>
<th>Diameter, cm (x)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>small</td>
<td>4.0 - 6.0</td>
</tr>
<tr>
<td>B</td>
<td>medium</td>
<td>6.1 - 8.0</td>
</tr>
<tr>
<td>C</td>
<td>large</td>
<td>&gt;8.0</td>
</tr>
</tbody>
</table>

CASSAVA DIAMETER: THICKEST CROSS-SECTION AREA OF CASSAVA ROOT

Ref: ARS 886:2018, Fresh Pineapple — Specification
(2) See Clause 4 Provisions concerning quality, (3) 4.2 Minimum requirements
REJECT
PACKAGING

Cassava shall be packed in such a way as to protect the produce properly.

The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non toxic ink or glue.

MARKING AND LABELLING

Each package must bear the following particulars in letters grouped on the same side, legibly and indelibly marked and visible from the outside:

name of the produce to be shown on the label shall be “Fresh sweet cassava”; name and location address of the vendor and/or packer shall be declared; country of origin of the produce, and optionally, place of origin such as district, or region; commercial identification shall be declared by ( grade (only when classified); variety/cultivar or type; size (size code); and net weight (in metric system)); lot identification (batch number); declaration of preservatives, if used; The name and address of the producer and/or packer shall be declared; preparation instructions, statement indicating that cassava should be peeled and fully cooked before being consumed; date of harvest; packing date; storage conditions; and Indication "for human food".

NON-RETAIL CONTAINER

Requirements

Indicate Class; Size (size code or minimum and maximum diameter in centimeter); Net weight; preparation instructions, statement indicating that “cassava should be peeled and fully cooked before being consumed.”

Ref: ARS 886:2018, Fresh Pineapple — Specification

(5) See Clause 4.4 Classification, (6) 4.4.1 "Extra" Class (7) 4.4.2 Class I (8) 4.4.3 Class II
CASSAVA PRODUCTS

CASSAVA FLOUR
The raw material shall be dried cassava chips, paste, crumbs or cassava roots.

DRYING CASSAVA: CASSAVA SHALL BE DRIED IN CLEAN PLACES

GENERAL REQUIREMENTS
Cassava flour shall be
1. free from filth.
2. free of off flavours and odours.
3. free from any living insects and foreign matter.
4. safe and suitable for human consumption.
5. have colour characteristic of the variety.

CASSAVA FLOUR: MOISTURE CONTENT, 13%, CRUDE ASH CONTENT, 3.0%
SPECIFIC REQUIREMENTS

Compositional requirements for cassava flour

<table>
<thead>
<tr>
<th>S/N</th>
<th>Parameter</th>
<th>Requirement</th>
<th>Method of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crude ash content, % m/m, dry matter basis, max.</td>
<td>3.0</td>
<td>ISO 2171</td>
</tr>
<tr>
<td>2</td>
<td>Moisture content, % by mass, max.</td>
<td>13.0</td>
<td>ISO 712</td>
</tr>
<tr>
<td>3</td>
<td>Crude fibre content, % m/m, dry matter basis, max.</td>
<td>2.0</td>
<td>ISO 5498</td>
</tr>
<tr>
<td>4</td>
<td>Acid insoluble ash, % m/m, dry matter basis max.</td>
<td>0.60</td>
<td>Annex A</td>
</tr>
<tr>
<td>5</td>
<td>Starch (on dry basis), % by mass, Min</td>
<td>60.0</td>
<td>ISO 15914</td>
</tr>
<tr>
<td>6</td>
<td>Hydrogen cyanide</td>
<td>10.0</td>
<td>ARS 844:2013</td>
</tr>
<tr>
<td>7</td>
<td>Total acidity, % m/m, max</td>
<td>1.0</td>
<td>Annex B</td>
</tr>
</tbody>
</table>

PACKAGING

Cassava flour shall be packaged in food grade material.

The net weight of the packages for cassava flour may be required to meet the relevant regulations of the destination country.
MARKING AND LABELLING

The specific labelling requirements shall apply and shall be legibly and indelibly marked:

1. The common name of the food shall be “Cassava flour” and the terms “Fine” or “Coarse”, in accordance with 4.4, shall appear in close proximity to the name of the food.
2. Name, location and address of the manufacturer shall be declared and/or brand name / trade name.
3. Date of manufacture.
4. Lot identification.
5. Best before date.
6. Country of origin shall be declared.
7. Net contents shall be declared by weight in metric (‘Systeme International’) units.
8. The statement ‘food for human consumption’
10. Instructions on disposal of used package.
CASSAVA FLOUR MARKING AND LABELLING: SHALL COMPLY TO LABELLING REQUIREMENTS
GENERAL REQUIREMENTS

CASSAVA BREAD

GENERAL REQUIREMENTS
Cassava bread shall be:

- free from objectionable flavours, odours and insects; and
- filth (impurities of animal origin, including dead insects)

SPECIFIC REQUIREMENTS
Cassava bread shall conform to the requirements specified below:

<table>
<thead>
<tr>
<th>S/N</th>
<th>Parameter</th>
<th>Requirement</th>
<th>Method of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moisture content, %, by mass, max.</td>
<td>12.0</td>
<td>ISO 712</td>
</tr>
<tr>
<td>2</td>
<td>Crude fibre, % by mass</td>
<td>3.5 – 4.0</td>
<td>ISO 5498</td>
</tr>
<tr>
<td>3</td>
<td>Ash</td>
<td>2.0</td>
<td>ISO 2171</td>
</tr>
<tr>
<td>4</td>
<td>Acid insoluble ash, %, by mass, max</td>
<td>0.20</td>
<td>Annex A</td>
</tr>
<tr>
<td>5</td>
<td>pH of aqueous extract</td>
<td>5.3 – 6.0</td>
<td>ISO 1842</td>
</tr>
<tr>
<td>6</td>
<td>Hydrogen cyanide.mg/kg,max</td>
<td>10.0</td>
<td>FDARS 844</td>
</tr>
</tbody>
</table>
PACKAGING
Cassava bread shall be packed in food grade material.

The net weight of the packages for cassava bread may be required to meet the relevant regulations of the destination country.

MARKING AND LABELLING
In addition to the requirements of ARS 56, the following specific labelling requirements shall apply and shall be legibly and indelibly marked:

1. common name of the product ‘Cassava Bread’;
2. name, and physical address of the manufacturer/ distributor and /or trade name/ brand name;
3. date of manufacture;
4. list of ingredients;
5. lot identification;
6. best before/expiry date;
7. the net weight in metric units;
8. storage instructions;
9. declaration of flavouring agent or spice used; and
10. instructions on disposal of used package.
11. Nutritional claims (Where any nutritional claim is made referring to the Cassava Bread, full nutritional information shall be given.)
CASSAVA CRISPS
GENERAL REQUIREMENTS
Cassava crisps shall:

- not show any blisters or noticeable separation between the outer and the inner portions
- be crunchy or crispy and free from sogginess and excessive oil
- light yellow to golden brown in color.
- free from off-flavor, rancidity, bitter taste and any other blemish.
- uniform in size and have a thickness of between 1.0 mm - 1.5 mm
- where spices or other additives are used, the color shall be characteristic of that ingredient
GENERAL REQUIREMENTS

SPECIFIC REQUIREMENTS
Cassava crisps shall conform to the compositional requirements specified below:

<table>
<thead>
<tr>
<th>S/N</th>
<th>Parameter</th>
<th>Requirement</th>
<th>Method of test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moisture content, %, by mass, max.</td>
<td>5</td>
<td>ISO 712</td>
</tr>
<tr>
<td>2</td>
<td>Fat content on dry weight, %, max.</td>
<td>35</td>
<td>ISO 11085</td>
</tr>
<tr>
<td>3</td>
<td>Free fatty acids on dry weight basis, %, max.</td>
<td>0.5</td>
<td>Annex B</td>
</tr>
<tr>
<td>4</td>
<td>Sodium chloride (NaCl) on dry weight basis, %, max</td>
<td>2.0</td>
<td>Annex C</td>
</tr>
<tr>
<td>5</td>
<td>Potential cyanide, mg/kg, max</td>
<td>10</td>
<td>ARS 844:2013</td>
</tr>
<tr>
<td>6</td>
<td>Acid insoluble ash, %, by mass, max</td>
<td>0.05</td>
<td>Annex A</td>
</tr>
<tr>
<td>7</td>
<td>Peroxide value, meq oxygen per gram,max</td>
<td>0.5</td>
<td>ISO 3960 or ISO 27107</td>
</tr>
</tbody>
</table>

PACKAGING
Cassava crisps shall be packaged in food grade material.
The net weight of the packages for cassava crisps may be required to meet the relevant regulations of the destination country.

MARKING AND LABELLING
The labelling requirements below shall apply and shall be legibly and indelibly marked:
1. common name of the product 'Cassava Crisps';
2. name, and physical address of the manufacturer/ distributor and /or trade name/ brand name;
3. if spiced they shall be labelled ‘Spiced Cassava Crisps’;
4. date of manufacture;
5. list of ingredients;
6. lot identification;
7. Best before/ expiry date;
8. country of origin;
9. the net weight in metric units;
10. storage instructions;
11. declaration stating “salted” or “unsalted”;
12. instructions on disposal of used package.
13. Nutritional Profile/Information of cassava crisps need to be stated on the packaging material used.
FOOD SAFETY CONCERNS
FOOD SAFETY CONCERNS

Food Safety in cassava can be checked in handling, preparation, and storage in order to prevent foodborne illness. Food hygiene is regularly cited as a cause of food poisoning. Those who produce and distribute pineapples must respect rules of hygiene, but individuals should also be concerned about the food they eat.

Food poisoning is not caused solely by insufficient hygiene but also by various types of contaminants which, at certain concentrations, can be toxic for the consumer. Despite the recognized health benefits of regular fruit and vegetable consumption, recent studies on consumer exposure to pesticide residues point to an identifiable risk of poisoning for some groups such as children. (Claeys., 2010).

Risks for the average consumer, however, remain low, but they can be reduced further when simple and efficient hygiene rules are applied and all operators implement food safety management systems based on an analysis of the hazards linked to their professional practices and the type of product they handle.

In order to meet food quality and safety requirements, agricultural businesses must identify all aspects of their activities that are decisive factors for the safety of their products. They must be able to control all hazards at all stages of product life cycle (development, production, storage, transport, marketing) in order to meet specifications (regulatory and market) and assure consumers that their food is safe.

The farmers and the producers must be able to identify all hazards (physical, biological or chemical) that can potentially contaminate their products at different stages of production. They must also be able to assess the level of each risk (probability) according to their working conditions, procedures and practices. On the basis of these analyses, the appropriate control measures, adapted to the type and level of risk, can be adopted. The company must then make sure that these measures are effectively implemented, complied with and regularly reviewed.
REDUCING RISKS FROM ANIMALS AND MANURE

Animal manure is a significant source of human pathogens. Dangerous pathogens such as E. coli O157:H7, Listeria, and Cryptosporidium are found in cattle, sheep, and deer feces. These pathogenic bacteria can be transferred from cassava to m cassava by human hands or contaminated processing equipment. The bacteria reside on the m cassava tough outer skin but can be transferred to its pulpy interior when the pineapples is opened.

Droppings from poultry, wild birds, and even pets are a potential source of Salmonella bacteria. When raw manure is not handled and applied correctly or if wild or domestic animals have access to growing areas, cassava could be contaminated.

WILD AND DOMESTIC ANIMALS

It is not possible to exclude all animal life from cassava growing areas. But it is important that you consider the risks and set up procedures to limit potential contamination.

• Take measures to limit wild/domestic animal access to cassava growing areas.

• Do not locate cassava growing areas adjacent to dairy, livestock, or fowl production facilities unless adequate barriers exist.

• Fence in livestock to exclude them from cassava growing areas.

• If using working animals, confine them to lanes outside growing areas close to harvest.

• Have procedures in place to remove and dispose of droppings.

• Make sure workers in animal holding areas check their shoes for contamination before entering cassava growing areas.

• Monitor for signs of animal entry such as the presence of feces, damage to the crop, or evidence of deer trails in or cassava growing areas.
FOOD SAFETY CONCERNS

SHOE DISINFECTION MAT: Visitors shall disinfect their shoes before entering the production area.

BOOT WASH AND DISINFECT MACHINE: Farm workers must wash their boots to avoid contamination before entering cassava growing areas.
FOOD SAFETY CONCERNS

NOT ALLOWED: Farm workers in animal holding areas must not enter cassava growing areas with muddy boots.
FOOD SAFETY CONCERNS

ANIMAL MANURE AS A SOIL SUPPLEMENT

Raw and composted animal manure is a valuable soil conditioner and source of nutrients. However, the shorter the time between raw manure application and harvest, the greater the risk of pathogens being present in the soil at the time of harvest.

- Do not apply raw manure on pineapples during or immediately prior the growing season.
- Never apply raw or farm-composted human feces to cassava growing areas.
- Maximize the time between application of manure to production areas and harvest.
- Incorporate manure into the soil as soon as possible. Soil microorganisms can reduce pathogens.
- Consider treatment of manure by composting in order to reduce potential pathogens. To reduce pathogen loads, maintain compost at high temperatures with good aeration, moisture, and mixing.
- Properly store compost to minimize recontamination from fresh manure and bird droppings by tapping, using buffer zones.
REDUCING FOOD SAFETY RISKS DURING HARVEST

During harvest look for ways to reduce contaminating cassava as much as possible. Harvest tools, bins, harvesters, and the environment are all potential sources of contamination.

HARVEST
Before and during harvest take time to look for conditions that might affect cassava safety. Be aware that harvesting involves a lot of hand contact and take measures to prevent contamination of produce by workers.

- Make sure harvesters have washed their hands before starting to harvest cassava.
- Conduct an inspection of the cassava growing area before harvest to determine if animals or animal droppings are present.
- Harvesters must reject cassava that shows decay, is damaged, or has visible signs of bird droppings.
- No cassava that comes in contact with animal or bird feces should be harvested.
- Farm workers should watch for signs of animal waste in nearby areas.

ALLOWED: Harvesters must wash their hands with clean running water before harvest cassava.
NO CASSAVA THAT COME IN CONTACT WITH ANIMAL OR BIRD DROPPINGS SHOULD BE HARVESTED.

FARM WORKERS SHOULD WATCH FOR SIGNS OF ANIMAL WASTE IN NEARBY AREAS.
HARVEST CONTAINERS AND TOOLS

Keep them clean. There is no good reason for putting clean cassava in a dirty container that might introduce a pathogen.

- Choose containers that can be cleaned, such as plastic.

- Clean containers and tools between uses so they do not serve as a source of pathogens that can spread from m cassava to cassava.

- Use your harvest containers and tools only for produce. Never use them for storing chemicals or as trash containers. Use separate containers for collecting rejects during grading and packing.

- Inspect reusable containers before harvest to make sure they are in good repair and free of splinters, nails, or other embedded objects.

- Food-contact carries, bins, and other harvest containers that cannot be repaired or adequately cleaned should be thrown away.

- During the off-season, best practices are to store food-contact harvest containers indoors off the floor in a clean, dry place.
REDUCING FOOD SAFETY RISKS IN THE WAREHOUSE

Basic sanitation recommendations for keeping packing areas clean and appropriately sanitary.

WAREHOUSE

• An enclosed packing area is preferred.

• Keep packing area clean, orderly, and well lit.

• Have a regular cleaning schedule for all areas, including equipment, walls, floors, and overhead structures.

• Inspect interior walls and floors for signs of water entry or holes. Fill cracks with grout or other appropriate filler materials.

• Water should drain away.

• Look for overhead places where birds can perch. Prevent perching with methods such as covering rafters, installing bird spikes, or installing steep-sided pyramids on beams.

• Areas outside of the packing buildings should be cleared of tall grass, weeds, and idle equipment that can provide hiding places for rodents.

• Allow sufficient space between equipment and interior walls to make inspecting for pests easier.

• Walk the perimeter of your packing building. Check for damage to the roof and cracks or holes in exterior walls that could allow pests to enter.

• Trees provide cool shade, but they are perching sites for birds. Consider ways to reduce the risk from these birds.

• Keep pests out.
Enclosed packing area. Keep packing area clean, orderly, and well lit. Have a regular cleaning schedule for all areas, including equipment, walls, floors, and overhead structures.


Penn State Extension Farm Food Safety team; Tianna DuPont, Penn State Extension; and Luke LaBorde, Penn State Department of Food Science. Reviewed by Lee Stivers and Thomas Ford, Penn State Extension.

Google images

Flick photos


A review of cassava in Africa with country case studies on Nigeria, Ghana, the United Republic of Tanzania, Uganda and Beni http://www.fao.org/3/a-a0154e.pdf


http://www.arc.agric.za/arc-iic/Pages/Cassava.aspx
Cassava starch and its uses http://www.fao.org/docrep/x5032e/x5032E06.HTM

The adoption of improved cassava varieties and their potential as livestock feeds in southwestern Nigeria http://www.fao.org/wairdocs/ILRI/x5458E/x5458e0c.htm

International Society for Plant Pathology

ARS GAPM 25:2018
Good Agricultural Practices Outreach Information for African Standards on Fresh Cassava and Derived Products

Based on ARS 835-2016 Fresh sweet cassava Specification
ARS 836-2016 Fresh bitter cassava Specification
ARS 837-2016 Fresh cassava leaves Specification
ARS 838-2016 Cassava flour Specification
ARS 839-2016 Dried cassava chips Specification
ARS 840-2016 High quality cassava flour Specification
ARS 843-2016 Cassava crisps Specification
ARS 844-2016 Cassava and cassava products Determination of total cyanogens Enzymatic assay method
ARS 845-2016 Production and handling of fresh cassava Code of practice
ARS 846-2016 Food grade cassava starch Specification
ARS 853-2016 Cassava bread Specification