DEAS 776: 2022

ICS 67.080.20

# DRAFT EAST AFRICAN STANDARD

## Production and handling of fresh cassava root — Code of practice



## EAST AFRICAN COMMUNITY


2022

Second Edition

## Copyright notice

# Contents

Page

# Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards. XXXXXX.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 016, *Fresh fruits, vegetables, tubers and flowers.*

This second edition cancels and replaces the first edition (EAS 776:2012), which has been technically revised.

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

# Introduction

This code focuses upon issues that are specific to the primary production and packaging of fresh cassava root in order to produce a quality, safe and wholesome product.

This code addresses Good Agricultural Practices (GAPs), Good Hygiene Practices (GHPs) and Good Manufacturing Practices (GMPs) that will help control microbial, chemical and physical hazards associated with all stages of the production of fresh cassava root from primary production to packaging. Particular attention is given to minimizing damage and deterioration of fresh cassava root before marketing.

This code does not provide detailed information, which is considered to be generally applicable to all fruits and vegetables or food products in general. Such provisions are available in other codes. As such, this code should be used in conjunction EAS 39 and CAC/RCP 53, Code of hygienic practice for fresh fruits and vegetables.



 

# Production and handling of fresh cassava root — Code of practice

## 1 Scope

This Draft East African Code provides recommended practices for the production, storage, packaging and transportation of fresh cassava root *Manihot esculenta Crantz* 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.

EAS 38, *General standard for labeling of prepackaged foods*

EAS 39, *Hygiene in the food and drink manufacturing industry – Code of practice*

CAC/RCP 53, *Code of hygienic practice for fresh fruits and vegetables*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at http://www.iso.org/obp

**3.1**
**fresh cassava root**
unpeeled roots from varieties of cassava *Manihot esculanta* (*Crantz*)

**3.2**
**agricultural inputs**
any incoming material (including water, agricultural chemicals and planting material) used for the primary production of fresh cassava roots

**3.3**
**biological control**
use of competing biological agents (such as insects, micro-organisms and/or microbial metabolites) for the control of pests, plant pathogens and spoilage organisms.

**3.4**
**primary deterioration**
deterioration as a result of physiological changes characterised by vascular streaking or vascular discoloration.



 

**3.5**
**secondary deterioration**
deterioration induced by micro-organisms that cause rotting under aerobic and anaerobic conditions.

**3.5**
**curing**
operation of self-healing of wounds, cuts and bruises

# 4 Primary production and handling of fresh cassava root

## 4.1 General requirements

Fresh cassava root is grown and harvested under a wide range of climatic and diverse geographical conditions, using various agricultural inputs and technologies. Biological, chemical and physical hazards may vary significantly from one type of production to another.

In each primary production area, it is necessary to consider the particular agricultural practices that promote the production of safe fresh cassava root, taking into account the conditions specific to the primary production area, varieties of fresh cassava root and methods used.

During production, primary and secondary deterioration should be avoided so as to maintain the quality of fresh cassava root. Procedures associated with primary production should be conducted under good hygienic conditions and should minimize potential hazards to health due to the contamination of fresh cassava root in accordance with EAS 39 and CAC/RCP 53.

### 4.2 Agricultural input requirements

**4.2.1** Inputs used for the production of fresh cassava root shall conform to the relevant East African Standards.

**4.2.2** Agricultural inputs shall not contain microbial or chemical contaminants at levels that may adversely affect the safety and quality of fresh cassava root.

**4.2.3** Growers shall use only agricultural inputs which are approved by the Competent Authority for the cultivation of fresh cassava roots and shall use them according to the product label for the intended purpose.

**4.2.4** The disposal of surplus chemical and used containers shall be in accordance to the national environment regulatory agency guidelines.

**4.2.5** Residues shall not exceed levels as established by the Codex Alimentarius Commission.

**4.2.6** Agricultural workers who apply agricultural chemicals shall be trained in proper application procedures.

**4.2.7** Growers shall keep records of agricultural chemical applications. Records should include information on the date of application, the chemical used, the crop sprayed, the pest or disease against which it was used, the concentration, method and frequency of application, and records on harvesting to verify that the time between applications and harvesting is appropriate.

**4.2.8** Agricultural implements and equipment shall be calibrated, as necessary, to control the accuracy of application.

**4.2.9** Agricultural chemicals should be kept in their original containers, labelled with the name of the chemical, storage conditions, expiry date and the instructions for application and use



 

### 4.3 Handling during production

During the primary production and post-harvest activities, effective measures shall be taken to prevent contamination of fresh cassava root from agricultural inputs or personnel who come directly or indirectly into contact with fresh cassava root.

To prevent contamination, fresh cassava root growers, harvesters and handlers shall adhere to the following:

a) Fresh cassava root unfit for human consumption should be segregated during harvesting. That which cannot be made safe by further processing should be disposed of properly;

b) Agricultural workers should not use harvesting containers for other purposes (e.g. lunches, tools, fuel, etc.). Where such containers have to be used for other purposes they shall be cleaned and sanitized; and

c) Care shall be taken when packing fresh cassava root in the field to avoid exposure to contamination with animal/human filth.

### 4.4 Handling during harvesting

Fresh cassava roots can be harvested at any time of the year. The food quality of the roots, particularly the starch content, increases with time up to an optimal period after planting, after which there is a loss of quality, mainly due to increased lignification. However, excessive harvesting of the leaves can have a negative effect on the yield of roots.

Careful harvesting and proper handling of roots is an important step towards successful storage.

Harvesting fresh cassava roots may either be done by hand where the soils are soft or by digging or mechanical harvesting around the roots in hard soils so as to free the roots from the plant.

The plant should be lifted using the lower part of stem and pulling the roots out of the ground, then removing them from the base of the plant by hand. Levers and ropes can be used to assist harvesting.

To facilitate lifting, the plant should be cut down about 30 cm - 50 cm above the ground. The protruding stem shall be used to lift the roots out of the ground and care should be taken not to break the roots. This leads to losses if broken roots are not retrieved from the soil and to contamination that may evolve into root spoilage.

Care should be taken during the harvesting process to minimize damage such as bruising, scrapping or breaking of the roots, as this greatly reduces shelf life. Roots should not be thrown or dropped down as this may accelerate deterioration.

Avoid injuring the roots at harvest by the digging tools, which may be wooden sticks, machetes, hoes or forks.

## 5 Storage and preservation

### 5.1 General

Fresh cassava roots generally deteriorate very quickly soon after harvest and this is due to the fact that the root of fresh cassava as a storage organ has no dormancy, function in propagation and possesses no bud primordia from which re-growth can occur.

Fresh cassava roots are still living organisms after they have been harvested and losses that occur during storage arise mainly from their physical and physiological condition.

The main causes of loss are associated with mechanical damage, physiological condition (maturity, respiration, water loss), diseases and pests. To ensure effective storage of root and tuber crops, these major



 

causative factors need to be properly understood and, where appropriate, be properly controlled, taking into account the socio-economic factors which prevail in the areas of production and marketing.

### 5.2 Handling during storage

Fresh cassava roots shall be harvested and handled with extreme care if they are to be kept for more than a week. There are a number of different practices which, if used in combination, will assist in delaying deterioration:

a) Cutting off the leaves, leaving only a part of the stem above ground. This operation should be done about seven days prior to harvesting;

b) As fresh cassava roots usually start rotting from the neck, (i.e. the point of attachment of the root to the parent plant), harvesting the roots with part of the stem (2 cm - 5 cm) still attached may prevent a rapid spread of decay into the root;

c) Minimize damage at lifting by harvesting while the soil is wet, for example after a rain;

d) Retain only those roots that do not show signs of injury. Roots that are to be kept for more that one week or more should be carefully selected since curing will not be effective on roots with extensive damage; and

e) Establish curing of the roots after harvest as a routine operation with, as far as possible, the minimum of handling.

Severely damaged roots should not be stored because of the following reasons:

a) lower quality;

b) increased risk of subsequent pathogenic losses; and

c) risk of introducing disease organisms into sound produce.

### 5.3 Control of damage

Fresh cassava roots should be handled so as to minimize abrasion and breaking of the skin because of its relatively soft texture. Most mechanical damage occurs as a result of careless handling at harvest and during transport to and within a store.

### 5.4 Temperature control

Temperature has a great influence on many factors that cause loss during storage such as the development of rotting micro-organisms and insect infestation. The appropriate storage temperature should be between 4 °C to 10 °C in order to reduce the rate of respiration and rotting of the fresh cassava roots.

### 5.5 Curing of fresh cassava roots

Fresh cassava roots have the ability to heal their skin wounds when held at relatively high temperatures and humidity for few days after harvest while at the same time there is a general strengthening of the skin. The crop may undergo the operation of curing immediately after harvest and factors that may affect the healing of wounds are

a) temperature of the produce,

b) oxygen and carbon dioxide concentration within the produce, and

c) humidity within the produce.



 

## 5.6 Storage methods

### 5.6.1 Storage in the soil before harvest

a) Roots may be stored by leaving them un-harvested after the optimum harvest stage depending on the variety and ecological conditions, however, fresh cassava roots will become fibrous and woody and their starch content and palatability decreases,

b) be attacked by pests and pathogens, and

c) become more susceptible to deterioration while still in the ground.

### 5.6.2 Storage pits/heaps

Roots may be kept in pits/heaps for a short period (2 days - 3 days) by:

a) re-burying in trenches covered with plant material and soil;

b) piling in heaps and kept moist by watering them daily; and

c) covering by applying a thick coating of soft clay or mud.

### 5.6.3 Storing fresh cassava roots in crates/ baskets/boxes

Freshly harvested cassava roots can be stored in wooden crates or baskets. The crates are lined with a layer of sawdust, wood shavings, peat or any other suitable adsorbent materials. The spaces between the roots are also filled with sawdust. Finally, the roots are then covered with sawdust.

The sawdust should be damp but must not be wet. If the sawdust is too dry the roots will deteriorate quickly. Sawdust which is too moist promotes the formation of mould and rot. To prevent the roots drying out too early, the crate should be lined with plastic foil.

The crates or baskets can simultaneously be used as containers during transport (also several times) which saves on handling costs and also reduces injury to the roots during transport.

### 5.6.4 Storing fresh cassava roots in a dip

Fresh cassava roots may be stored in potable water in various sized containers. The containers are filled with potable water and the roots are completely submerged. This process may also be used as for simultaneously detoxifying the roots which contain hydrogen cyanide.

The effectiveness of this method depends greatly on the degree of freshness of the roots when they are stored.

### 5.6.5 Storage in plastic bags or plastic film wraps

Plastic bags may be used to preserve fresh cassava roots by avoiding the loss of moisture and water stress.

Fresh cassava roots treated with an appropriate fungicide such as thiabendazole and kept in an airtight plastic bag or a plastic film wrap can be stored for two to three weeks.

Fresh cassava roots should be dipped in a 0.4% w/w solution of thiabendazole for 10 seconds and storing in plastic bags.

Fresh cassava roots may also be treated with household bleach (0.95% active chlorine). The use of household bleach is as effective as thiabendazole if sound fresh cassava roots are not stored for much longer than seven days.



 

Freshly harvested roots are put into bags. Fungicides should be applied before the bags are closed to avoid the formation of mould and rot.

High temperatures (above 40°C) as well as low temperatures (below 10°C) may be used to enhance the effect on the duration of storage.

#### 5.6.6 Other methods

Other methods of storage and preservation include refrigeration, waxing of the roots and chemical treatment.

##### 5.6.6.1 Refrigeration

Reduced temperatures extend the storage ability of fresh cassava roots by delaying the deterioration processes which occur rapidly at normal storage temperatures. Experiments have shown that the most favourable temperature for the storage of fresh cassava roots is 3°C.

##### 5.6.6.2 Waxing

Fresh cassava roots may be stored preserved by coating them in food grade wax. The wax may or may not be supported with a fungicide.

## 6 Sorting and packing for export

With suitable handling and storage, fresh cassava root can be successfully transported for long distances including export by sea-shipment. Fresh cassava root may be graded in terms of size and shape.

The optimum handling system is as follows:

a) fresh cassava root shall be carefully cleaned and treated in accordance with 5.6.5;

b) after washing and fungicide treatment, the fresh cassava root should be left overnight in a well ventilated area to dry before packing for departure; and

c) during shipment, the required storage temperature is 10°C - 15°C.

## 7 Packaging and labelling

**7.1** Packaging materials shall be suitable for packing and transporting fresh cassava root.

**7.2** Packaging materials shall protect the produce against mechanical damage, ease handling and transportation including accounting for quantity in the lot.

**7.3** The selection of suitable containers for commercial scale marketing requires very careful consideration. The following factors should be considered in choosing packaging materials:

a) the level of losses occurring during marketing;

b) the comparative cost of the present and improved packaging;

c) the regularity of supply of the packaging material; and

d) the acceptance of the packaging method to the market.

**7.4** Among the various types of packaging material that are available, the following are used:

a) natural and synthetic fibre sacks;



 

b) moulded plastic boxes;

c) sawn wooden boxes;

d) cardboard boxes; and

e) paper or plastic film sacks.

**7.5** The net weight shall be:

a) in metric units; and

b) not more than 50 kg in line with ILO guidelines.

Note: For sea-shipment, an additional 5% packing weight may be required due to weight loss which will occur during storage and shipment.

**7.6** The labelling of packaged fresh cassava root shall be in accordance with EAS 38



 

# Bibliography

[1] EAS 776:2012, *Production and handling of fresh cassava — Code of practice*