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## **DRAFT EAST AFRICAN STANDARD**

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**Production and handling ware potato tuber — Code of practice.**

**EAST AFRICAN COMMUNITY**

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## 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 775:2012), 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 ware potato tuber 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 ware potato tuber from primary production to packaging. Particular attention is given to minimizing damage and deterioration of ware potato tuber 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 ware potato tuber — Code of practice

### 1 Scope

This Draft East African Standard provides recommended practices for the production, storage, packaging and transportation of ware potato tuber (*Solanum tuberosum* L.) 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

##### **ware potato tuber**

produce of species *Solanum tuberosum* (L.) grown for its tuber

#### 3.2

##### **agricultural inputs**

any incoming material including water, agricultural chemicals and planting material used for the primary production of ware potato tuber

#### 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



### **3.6**

#### **curing**

operation of self-healing of wounds, cuts and bruises

### **3.7**

#### **clamp**

rectangular depression in the field where ware potato tubers are stacked and covered with straw/hay and soil to act as temporary storage<sup>4</sup> Primary production and handling of ware potato tuber

## **4.1 General requirements**

Ware potato tuber 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 ware potato tuber, taking into account the conditions specific to the primary production area, varieties of ware potato tuber and methods used.

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

## **4.2 Agricultural input requirements**

**4.2.1** Inputs used for the production of ware potato tuber 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 ware potato tuber.

**4.2.3** Growers shall use only agricultural inputs which are approved by the Competent Authority for the cultivation of ware potato tuber 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 ware potato tuber from agricultural inputs or personnel who come directly or indirectly into contact with ware potato tuber.

To prevent contamination, ware potato tuber growers, harvesters and handlers shall adhere to the following:

- a) Ware potato tuber unfit for human consumption shall be segregated during harvesting. Those, which cannot be made safe by further processing should be disposed of properly.
- b) Agricultural workers should not use harvesting containers for other purposes (including, lunches, tools, fuel, etc.) Where such containers have to be used for other purposes they shall be cleaned and sanitized.
- c) Care shall be taken when packing ware potato tuber in the field to avoid exposure to contamination with animal/human filth.

### **4.4 Handling during harvesting**

**4.4.1** Ware potato tubers should be harvested when fully mature depending on the cultivar and the method of planting. Maturity can be assessed by:

- a) b)d) Cut the stem and leaves 7 days to 14 days before harvesting to harden the skin of the tuber to minimise loss during post-harvest handling and to minimise transmission of late blight
- b) Cutting ware potato tuber in the field and observing the colour of the latex exuded; latex from immature ware potato tuber turns black, while from mature tuber remains creamy-white
- c) rubbing the skin of the tuber; immature tubers skin easily peel off.

**4.4.2** Careful harvesting and proper handling of ware potato tuber is an important step towards successful storage.

**4.4.3** Ware potato tuber can be harvested manually or mechanically. Care should be taken during the harvesting process to minimize damage such as bruising, scrapping or breaking of the ware potato tuber, to minimize post-harvest losses.

**4.4.4** Whether harvested manually or mechanically, the produce shall be carefully handled and transported to the packing facility immediately.

## **5 Storage and preservation**

### **5.1 General**

Ware potato tubers generally do not store well, except under ideal conditions and bruised ones rapidly deteriorate. They can last up to 3-4 weeks.

Ware potato tubers 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 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 Preparing ware potato tuber for storage

Ware potato tubers should be harvested and handled with care to minimize deterioration during storage and the following should be adhered to:

- a) Retain only those tubers that do not show signs of injury. Tubers that are to be kept for more than one week or more should be carefully selected since curing will not be effective on tubers with extensive damage.
- b) Establish curing of the tubers after harvest as a routine operation with, as far as possible, the minimum of handling.

Severely damaged tubers 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

Mechanically damaged tubers will normally deteriorate rapidly and should not be stored and exported. Mechanical damage can occur during all handling operations, particularly harvesting and washing and damaged regions are more susceptible to microbial infection.

Careful handling should be done during all handling operations and adequate drying and curing should be ensured prior to packing and storage.

## 5.4 Temperature control

Temperature has a great influence on many factors that cause loss during storage; it influences the rate of sprout growth, the development of rotting micro-organisms and insect infestation. Storage at temperatures below 10 °C will result in sweetening while storage temperatures above 25 °C will result in increased decay, water loss and sprouting.

Ware potato tuber meant for fries, crisps and flour may be stored at 10 °C - 25 °C for four months while those for other products may be stored in cold storage for four months.

Temperature control methods should aim at slowing down rates of physiological and microbiological deterioration.

## 5.5 Curing of ware potato tuber

Ware potato tuber shall be properly cured as soon as possible after harvesting to promote the preservation of the skin as well as formation of a hard cork layer. Curing should be carried out near the place where the tubers will be stored to minimize handling after curing. The process is carried out for 4 days to 15 days at temperatures of 15 °C to 22 °C and a relative humidity of 85% to 95%.

## 5.6 Storage methods

### 5.6.1 General

The general storage area should be dark and well ventilated to avoid greening and accumulation of solanine.

### 5.6.2 Storage in the soil before harvest

Ware potato tuber may be stored by leaving them un-harvested for short periods before the optimum harvest age. Tubers should not be left in the ground as a method of storage beyond the optimum harvest period because of the danger of tubers being infested by pathogens and any other physiological deterioration.

### **5.6.3 Storage pits/heaps**

Storage in outdoor pits/heaps is not recommended because the dampness encourages decay

### **5.6.4 Storing ware potato tuber in crates/ baskets/boxes**

Harvested ware potato tubers can be stored in wooden crates or baskets. The crates shall be lined with a layer of sawdust, wood shavings, peat or any other suitable adsorbent materials. The spaces between the tubers are also filled with sawdust. Finally, the tubers are then covered with sawdust.

To prevent the tubers drying out too early, the crate should be lined with plastic foil. The sawdust should neither be damp nor wet. If the sawdust is too dry the tubers will deteriorate quickly. Sawdust which is too moist promotes the formation of mould and rot.

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 tubers during transport.

### **5.6.5 The field clamp**

Ware potato tuber may be kept in a clamp (preferably under shade) for up to eight weeks. The clamp shall be in a well-drained location. Temperatures inside a ventilated clamp will be approximately those of the ambient temperatures.

### **5.6.6 Other methods**

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

#### **5.6.6.1 Refrigeration**

Reduced temperatures extend the storage ability of ware potato tubers by delaying the rot processes which occur rapidly at normal storage temperatures. The most favourable temperature for the storage of ware potato tuber is 2°C - 4°C except for ware potato tuber meant for processing which should be stored in the range of 10°C - 15°C.

#### **5.6.6.2 Waxing**

Ware potato tubers 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, ware potato tuber can be successfully transported for long distances including export by sea-shipment. Ware potato tuber may be graded in terms of size and shape, with only one type being packed in one carton including small rounded, small elongated, medium round etc.

The suitable handling conditions for ware potato tubers are as follows:

- a) Ware potato tuber shall be carefully cleaned and dipped in a solution of 0.05% Thiabendazole for 15 seconds to 30 seconds.
- b) After washing and fungicide treatment, the ware potato tuber should be left overnight in a well ventilated area to dry before packing for departure.
- c) During shipment, the required storage temperature is 10 °C to 15 °C.

## **7 Packaging and labelling**

**7.1** Packaging materials shall be suitable for packing and transporting ware potato tuber.

**7.2** Packaging materials shall protect the produce against mechanical damage and ease handling 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) 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 ware potato tuber shall be in accordance with EAS 38.

## Bibliography

- [1] EAS 775:2012, *Production and handling of fresh ware potatoes — Code of practice*

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