



CD/K/037:2010  
ICS 67.080.10

## EAST AFRICAN STANDARD

---

Fresh asparagus — Specification and grading



EAST AFRICAN COMMUNITY

---

HS 0709.20.0000

## Foreword

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

In order to meet the above objectives, the EAC Partner States have enacted an East African Standardization, Quality Assurance, Metrology and Test Act, 2006 (EAC SQMT Act, 2006) to make provisions for ensuring standardization, quality assurance, metrology and testing of products produced or originating in a third country and traded in the Community in order to facilitate industrial development and trade as well as helping to protect the health and safety of society and the environment in the Community.

East African Standards are formulated in accordance with the procedures established by the East African Standards Committee. The East African Standards Committee is established under the provisions of Article 4 of the EAC SQMT Act, 2006. The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the private sectors and consumer organizations. 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 procedures of the Community.

Article 15(1) of the EAC SQMT Act, 2006 provides that "Within six months of the declaration of an East African Standard, the Partner States shall adopt, without deviation from the approved text of the standard, the East African Standard as a national standard and withdraw any existing national standard with similar scope and purpose".

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.

© East African Community 2010 — All rights reserved\*

East African Community

P O Box 1096

**Arusha**

Tanzania

Tel: 255 27 2504253/8

Fax: 255-27-2504481/2504255

E-Mail: [eac@eachq.org](mailto:eac@eachq.org)

Web: [www.each.int](http://www.each.int)

## Introduction

In the preparation of this East African Standard, the following sources were consulted extensively:

CODEX STAN 225:2001 (Rev. 2005), *Standard for Asparagus*

UNECE STANDARD FFV-04:1999, *Marketing and commercial quality control of asparagus*

*United States Standards for Grades of Fresh Asparagus*, Effective February 23, 2006

ISO 4186:1980, *Asparagus — Guide to storage*

ISO 6882:1981, *Asparagus — Guide to refrigerated transport*

CODEX STAN 193:1995 (Rev.5:2009), *General Standard for Contaminants and Toxins in Foods*

CODEX STAN 228:2001 (Rev.1:2004), *General methods of analysis for contaminants*

CODEX STAN 230:2001 (Rev.1:2003), *Maximum levels for lead*

Codex Alimentarius website: [http://www.codexalimentarius.net/mrls/pestdes/jsp/pest\\_q-e.jsp](http://www.codexalimentarius.net/mrls/pestdes/jsp/pest_q-e.jsp)

USDA Foreign Agricultural Service website: <http://www.mrldatabase.com>

USDA Agricultural Marketing Service website: <http://www.ams.usda.gov/AMSV1.0/Standards>

USDA Plant Inspectorate Service website: [http://www.aphis.usda.gov/import\\_export/plants](http://www.aphis.usda.gov/import_export/plants)

European Union: [http://ec.europa.eu/sanco\\_pesticides/public](http://ec.europa.eu/sanco_pesticides/public)

Assistance derived from these sources and others inadvertently not mentioned is hereby acknowledged.

This standard has been developed to take into account:

- the needs of the market for the product;
- the need to facilitate fair domestic, regional and international trade and prevent technical barriers to trade by establishing a common trading language for buyers and sellers.
- the structure of the CODEX, UNECE, USA, ISO and other internationally significant standards;
- the needs of the producers in gaining knowledge of market standards, conformity assessment, commercial cultivars and crop production process;
- the need to transport the product in a manner that ensures keeping of quality until it reaches the consumer;
- the need for the plant protection authority to certify, through a simplified form, that the product is fit for crossborder and international trade without carrying plant disease vectors;
- the need to promote good agricultural practices that will enhance wider market access, involvement of small-scale traders and hence making fruit and vegetable production a viable means of wealth creation; and
- the need to keep unsatisfactory produce from the market by allowing the removal of unsatisfactory produce from the markets and to discourage unfair trade practices e.g. trying to sell immature produce at the beginning of the season when high profits can be made. Immature produce leads to dissatisfaction of customers and influences their choices negatively, which disadvantages those traders who have waited until the produce is mature.

**Contents**

1	Scope .....	1
2	Normative references .....	1
3	Definitions.....	1
4	Provisions concerning quality .....	2
4.1	General.....	2
4.2	Minimum requirements .....	2
4.3	Classification .....	3
5	Provisions concerning sizing .....	5
5.1	Sizing by length .....	5
5.2	Sizing by diameter .....	5
6	Provisions concerning tolerances .....	6
6.1	Quality tolerances.....	6
6.2	Size tolerances .....	7
7	Provisions concerning presentation .....	7
7.1	Uniformity .....	7
7.2	Packaging.....	8
7.3	Presentation .....	8
8	Marking or labelling .....	8
8.1	Consumer packages.....	8
8.2	Non-retail containers .....	9
9	Contaminants .....	9
9.1	Heavy metals.....	9
9.2	Pesticide residues .....	10
10	Hygiene .....	10
	Annex A (informative) Guide to storage.....	43
	Annex B (informative) Guide to refrigerated transport .....	45
	Annex C (informative) Model certificate of conformity with standards for fresh fruits and vegetables	47
	Annex D (informative) Asparagus — Fact sheet.....	48
	Annex E (informative) Asparagus — Codex, EU and USA pesticide residue limits .....	53

## Fresh asparagus — Specification and grading

### 1 Scope

This Standard applies to shoots of commercial varieties of asparagus grown from *Asparagus officinalis* L., of the *Liliaceae* family, to be supplied fresh to the consumer, after preparation and packaging. Asparagus for industrial processing is excluded.

Asparagus shoots is classified into four groups according to colour:

- (a) white asparagus;
- (b) violet asparagus, having tips of a colour between pink and violet or purple and part of the shoot white;
- (c) violet/green asparagus, part of which is of violet and green colouring;
- (d) green asparagus having tips and most of the shoot green.

The shoots of asparagus are formed by the sprouting of buds on a rhizome (rootstock). By growing these shoots underground in ridges the asparagus stays white or violet. However, as a result of temperature and light, these shoots can be coloured violet/green. Green asparagus grow above the ground. Advancement can take place by covering the asparagus for instance with plastic tunnels. With the use of heat one speaks of forcing. Figures 1 to 6

The tips and the bracts of green asparagus can have a violet tint depending on the variety. Figure 7

This Standard does not apply to green and violet/green asparagus of less than 3 mm diameter and white and violet asparagus of less than 8 mm diameter, packed in uniform bundles or unit packages.

### 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.

CAC/GL 21, *Principles for the Establishment and Application of Microbiological Criteria for Foods*

CAC/RCP 1, *Recommended International Code of Practice — General Principles of Food Hygiene*

CAC/RCP 44, *Recommended International Code of Practice for the Packaging and Transport of Tropical Fresh Fruit and Vegetables*

CAC/RCP 53, *Code of Hygienic Practice for Fresh Fruits and Vegetables*

EAS 38, *Labelling of prepackaged foods — Specification*

CD/K/378:2010, *Horticultural industry — Code of practice*

### 3 Definitions

For the purpose of this standard the following definition shall apply:

#### 3.1

#### fresh

the stalk is not limp or flabby

**3.2**

**well trimmed**

at least two-thirds of the butt of the stalk is smoothly trimmed in a plane approximately parallel to the bottom of the container and that the butt is not stringy or frayed

**3.3**

**damage**

any defect, or any combination of defects, which materially detracts from the appearance, or the edible or marketing quality of the stalk

**3.4**

**diameter**

the greatest thickness of the stalk measured at a point approximately 1 inch from the butt

**3.5**

**fairly well trimmed**

at least one-third of the butt of the stalk is smoothly trimmed in a plane approximately parallel to the bottom of the container and that the butt is not badly stringy or frayed

**3.6**

**badly misshapen**

the stalk is so badly flattened, crooked or otherwise so badly deformed that its appearance is seriously affected

**3.7**

**serious damage**

any defect, or any combination of defects, which seriously detracts from the appearance, or the edible or marketing quality of the stalk

**4 Provisions concerning quality**

**4.1 General**

The purpose of the standard is to define the quality requirements of asparagus offered for placement in the market or at the export control stage, after preparation and packaging.

**4.2 Minimum requirements**

**4.2.1** In all classes, subject to the special provisions for each class and the tolerances allowed, the asparagus must be:

- (a) whole/intact; means not having any mutilation or injury spoiling the integrity of the produce. Figure 8
- (b) sound, produce affected by rotting or deterioration such as to make it unfit for consumption is excluded: The asparagus must be free from disease or serious deterioration which appreciably affects their appearance, edibility or market value. In particular, this excludes produce affected by rotting, even if the signs are very slight but liable to make the asparagus unfit for consumption upon arrival at their destination.

Asparagus showing the following defects are therefore excluded

- (i) diseases, Figure 9
- (ii) damage caused by high temperature or frost, Figures 10, 11
- (c) clean, practically free of any visible foreign matter; The asparagus must be practically free or visible soil, dust, chemical residue or other foreign matter. Figure 13

- (d) practically free of pests affecting the general appearance of the produce; Asparagus must be practically free of insects or other pests. The presence of pests can detract from the commercial presentation and acceptance of the asparagus. Figure 15
- (e) practically free of damage caused by pests; There must be no holes, mines and other damage caused by rodents or insects. Pest damage can detract from the general appearance, keeping quality and edibility of the asparagus. Figure 16
- (f) free of abnormal external moisture, excluding condensation following removal from cold storage; This provision applies to excessive moisture, for example, free water lying inside the package but does not include condensation on produce following release from cool storage or refrigerated vehicle.
- (g) free of any foreign smell and/or taste; This refers particularly to asparagus which have been stored on badly kept premises or have travelled in a badly maintained vehicle, especially asparagus which have acquired a strong smell from other produce stored on the same premises or travelling in the same vehicle. Therefore, care should be taken to use only non-smelling materials as protection in packaging.
- (i) fresh in appearance and fresh-smelling; The asparagus must not show signs of shrivelling and must not be limp or tough. The cut at the base of the shoots must not be dried up. Figure 14
- (j) practically unbruised; Bruises are a result of rough handling during harvesting and packaging.
- (k) free of damage caused by unsuitable washing or soaking. Soaking the asparagus after harvesting can lead to rot on tips, split shoots and translucent ("acid") shoots. These translucent ("acid") shoots are pale, sticky and have a foreign acid smell. The rotten tips are more pointed and black coloured. Figure 12

The cut at the base of the shoots must be as clean as possible. Frayed cuts are not allowed. Figure 17

In addition, shoots must be neither hollow, split, peeled nor broken. Small cracks which have appeared after harvesting are, however, allowed, so long as they do not exceed the limits laid down in 6.1.

Shoots which are hollow, split, peeled or broken are not allowed. Figures 18 to 21

Asparagus with small cracks which appear after harvesting are only allowed within the quality tolerances. Figure 22

**4.2.2** The development and condition of the asparagus must be such as to enable it:

- (a) to withstand transport and handling; and
- (b) to arrive in satisfactory condition at the place of destination.

### **4.3 Classification**

Asparagus is classified in three classes defined below:

#### **4.3.1 "Extra" Class**

Asparagus in this class must be very carefully presented.

Shoots in this class must be of superior quality, very well formed and practically straight. Figure 23

Having regard to the normal characteristics of the group to which they belong, their tips must be very compact. Figures 24, 25

## CD/K/037:2010

Only a few very slight traces of rust caused by non-pathogenic agents on the shoot, removable by normal peeling by the consumer, are allowed.

Rust may appear due to weather conditions and/or the type of soil. The tips must not show any traces of rust. Figure 26

For the white asparagus group, the tips and shoots must be white; only a faint pink tint is allowed on the shoots. Figure 27

Green asparagus must be green for at least 95% of the length. Colour must be typical of the group.

No traces of woodiness are allowed for the shoots in this class. Woodiness is characterized by a fibrous or tough lower end of the shoot.

The cut at the base of the shoots must be as square as possible. However, to improve presentation when the asparagus is packed in bundles, those on the outside may be slightly bevelled, so long as the bevelling does not exceed 1 cm. Figures 28, 29

### 4.3.2 Class I

Shoots in this class must be of good quality and well formed. They may be slightly curved. Figures 30, 31

The following slight defects, however, may be allowed provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

Having regard to the normal characteristics of the group to which they belong, their tips must be compact. Figures 32, 33

Slight traces of rust caused by non-pathogenic agents removable by normal peeling by the consumer are allowed. Rust may appear due to weather conditions and/or the type of soil. The tips must not show any traces of rust. Figure 34

For the white asparagus group, a faint pink tint may appear on the tips and the shoots. Figure 35

Green asparagus must be green for at least 80% of the length. Figure 36. Colour must be typical of the group.

In the white asparagus group, no woody shoots are allowed. For the other groups, a trace of woodiness on the lower part is permissible, provided this woodiness disappears by normal peeling by the consumer.

The cut at the base of the shoots must be as square as possible. Figure 28

Although the Class I quality requirements are less strict than for "Extra" Class, Class I asparagus must nevertheless be carefully selected and presented.

### 4.3.3 Class II

This class includes shoots which do not qualify for inclusion in the higher classes, but satisfy the minimum requirements specified in 4.2.

Compared with Class I, shoots may be less well formed, more curved and having regard to the normal characteristics of the group to which they belong, their tips may be slightly open. Figures 37, 38.

The following defects may be allowed provided the asparagus retain their essential characteristics as regards the quality, the keeping quality and presentation. With regard to the normal characteristics of the group to which the asparagus belong their tips may be slightly open. Floral buds may be visible provided they are held close to the tip. Figures 39, 40

Traces of rust caused by non-pathogenic agents, removable by normal peeling by the consumer are allowed.

Rust may appear due to weather conditions and/or the type of soil. Only exceptionally can the tips of asparagus show any minute rust spots. On no account should these spots be allowed when this requires peeling that may damage the tip. Figures 41, 42

The tips of white asparagus may have a colouration including a green tint. Figure 43

The tips of violet asparagus may have a slight green tint. Figure 44

Green asparagus must at least be green for 60 percent of the length. Figure 45

Colour must be typical of the group.

Shoots may be slightly woody. Asparagus of all groups may be slightly woody.

The cut at the base of the shoots may be slightly oblique. The cut at the base may be slightly oblique, but must always be as clean as possible. Figure 46

Asparagus in this class must be of marketable quality, suitably presented and suitable for human consumption.

## 5 Provisions concerning sizing

Sizing is compulsory for all classes and will be checked by package or bundle. Two factors must be considered, namely length and diameter of the shoot.

### 5.1 Sizing by length

Asparagus must comply with the length-reaches prescribed. The length of the shoots must be:

- above 17 cm for long asparagus;
- 12 to 17 cm for short asparagus;
- for Class II asparagus arranged, but not bundled in the package:
  - a) white and violet: 12 to 22 cm,
  - b) violet/green and green: 12 to 27 cm.
- under 12 cm for asparagus tips.

In the case of long asparagus the shoots may vary between 17 cm to 22 cm in length for white and violet asparagus and between 17 cm and 27 cm for violet/green and green asparagus.

The maximum difference in length of shoots packed in firmly bound bundles must not exceed 5 cm.

According to 6.1 "Extra" Class asparagus packed in bundles the shoots must be of the same length. Therefore, only shoots of Classes I and II may deviate up to 5 cm in length.

### 5.2 Sizing by diameter

The diameter of the shoots shall be measured 2.5 cm from the cut end. Figure 47

The minimum diameter and sizing shall be:

**White and Violet:**

Class	Minimum diameter	Sizing
Extra	12 mm	Maximum variation of 8 mm between the thinnest and the thickest shoot in the same package or the same bundle.
I	10 mm	Maximum variation of 10 mm between the thinnest and the thickest shoot in the same package or the same bundle.
II	8 mm	No provision as to uniformity.

**Violet/green and green asparagus:**

Class	Minimum diameter	Sizing
Extra and I	3 mm	Maximum variation of 8 mm between the thinnest and the thickest shoot in the same package or the same bundle.
II	3 mm	No provision as to uniformity.

For all classes, asparagus must comply with a minimum diameter in accordance with the relevant colour group. In addition, for produce classified in “Extra” Class and Class I, the asparagus must be sized so that the maximum difference in diameter between the largest and smallest shoot in the same package or bundle does not exceed the limits set out for the relevant colour group.

**6 Provisions concerning tolerances**

Tolerances in respect of quality and size shall be allowed in each package for produce not satisfying the requirements of the class indicated.

Tolerances are provided to allow for human error during the grading and packing process. During grading and sizing it is not permitted to include out of grade produce, i.e. to exploit the tolerances deliberately.

The tolerances are determined after examining each sample package and taking the average of all samples examined. The tolerances are stated in terms of percentage by number or weight of produce in the total sample not conforming to the class or to the size claimed.

**6.1 Quality tolerances**

**6.1.1 “Extra” Class**

Five percent by number or weight of shoots not satisfying the requirements of the class, but meeting those of Class I or, exceptionally, coming within the tolerances of that class, or having slight unscarred cracks appearing after harvesting.

**6.1.2 Class I**

Ten percent by number or weight of shoots not satisfying the requirements of the class, but meeting those of Class II or, exceptionally, coming within the tolerances of that class, or having slight unscarred cracks appearing after harvesting.

**6.1.3 Class II**

Ten percent by number or weight of shoots satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting or any other deterioration rendering it unfit for consumption.

In addition, a tolerance of 10 % by number or weight can be allowed for:

- a) hollow shoots or
- b) shoots showing very slight cracks due to washing.

The maximum permitted tolerances are specified below:

- a maximum of 10 % by number or weight of asparagus is allowed not satisfying the requirements for Class II or the minimum requirements. This does not include asparagus not fit for consumption, i.e. rotten or severely damaged.
- a maximum of 15 % by number or weight of asparagus in each package or bundle is allowed for hollow shoots.
- a maximum of 20 % by number or weight of asparagus is allowed for shoots showing very slight cracks due to washing.

For example, the maximum tolerance quality level could be as follows:

- 5 % of the shoots badly cut + 5 % of the shoots too bent
- or
- 15 % of the shoots being hollow + 5 % of the shoots badly cut
- or
- 20 % of the shoots with slight cracks due to washing
- or
- 10 % of the shoots being hollow + 10 % of the shoots with slight cracks due to washing.

## 6.2 Size tolerances

For all classes, 10% by number or weight of shoots not corresponding to the size indicated and deviating from the specified limits with a maximum deviation of 1 cm in length.

For all classes, 10% by number or weight of shoots not corresponding to the size indicated and deviating from the specified limits with a maximum deviation of 2 mm in diameter. In no case shall the diameter be less than 3 mm.

## 7 Provisions concerning presentation

### 7.1 Uniformity

The contents of each package, each unit package or each bundle in the same package must be uniform and contain only asparagus of the same origin, quality, colour group and size (if sized). Figures 48 to 51

Nevertheless, with respect to colour, shoots of a different colour group may be allowed within the following limits:

- a) white asparagus: 10% by number or weight of violet asparagus in Classes Extra and I and 15% in Class II.
- b) violet, violet/green and green asparagus: 10% by number or weight of asparagus of another colour group.

In the case of Class II a mixture of white and violet asparagus is allowed provided it is appropriately marked.

The visible part of the contents of the package, unit package or bundle must be representative of the entire contents.

A special effort should be made to suppress camouflage, i.e. concealing in the bundle or in the lower layers of the package produce inferior in quality and size to that displayed and marked.

Similarly prohibited is any packaging method or practice intended to give a deceptively superior appearance to the top layer of the consignment.

## **7.2 Packaging**

Asparagus must be packed in such a way as to protect the produce properly. The materials used inside the package must be new<sup>1</sup>, clean, and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications is allowed, provided the printing or labelling has been done with non-toxic ink or glue.

Packages must be of a quality, strength and characteristics to protect the produce during transport and handling.

This provision is designed to ensure suitable protection of the produce by means of materials inside the package which are new and clean and also to prevent foreign bodies such as leaves, sand or soil from spoiling its good presentation.

Packages must be free of all foreign matter. A visible lack of cleanliness in several packages could result in the goods being rejected.

Asparagus shall be packed in each container in compliance with CAC/RCP 44.

## **7.3 Presentation**

The asparagus may be presented under one of the following forms:

- (i) In bundles firmly bound or in unit packages; Figures 52 to 54  
Shoots on the outside of each bundle must correspond in appearance and diameter with the average of the whole bundle.  
In "Extra" Class, asparagus shoots packed in bundles must be of the same length.  
Bundles must be arranged evenly in the package, each bundle may be protected by paper.  
In any one package, bundles must be of the same weight.
- (ii) Arranged, but not bundled in the package; Figures 55, 56
- (iii) In prepackaged units placed in another package.

## **8 Marking or labelling**

### **8.1 Consumer packages**

In addition to the requirements of EAS 38, the following specific provisions apply:

#### **8.1.1 Nature of produce**

If the produce is not visible from the outside, each package shall be labelled as to the name of the produce and may be labelled as to name of the variety.

---

<sup>1</sup> For the purposes of this Standard, this includes recycled material of food-grade quality.

## 8.2 Non-retail containers

Each package<sup>2</sup> must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked, and visible from the outside, or in the documents accompanying the shipment.

In the case of packed produce, all particulars must be grouped on the same side of the package, either on a label attached to or printed on the package with waterinsoluble ink. Figures 57, 58

In the case of reused packages, all previous labels must be carefully removed and previous indications deleted.

### 8.2.1 Identification

Name and address of exporter, packer and/or dispatcher. Identification code (optional).<sup>3</sup>

### 8.2.2 Nature of Produce

“Asparagus” followed by the indication “white”, “violet”, violet/green” or “green” if the contents of the package are not visible from the outside and, where appropriate, the indication “short” or “tips” or “mixture white and violet”.

### 8.2.3 Origin of produce

Country of origin and, optionally, district where grown or national, regional or local place name.

### 8.2.4 Commercial identification

— Class;

— Size expressed:

- a) for asparagus subject to the uniformity rules as minimum and maximum diameters,
- b) for asparagus not subject to the uniformity rules, as minimum diameter followed by maximum diameter or the words “and over”.

— Number of bundles or number of unit packages, for asparagus packed in bundles or unit packages.

### 8.2.5 Official inspection mark (optional)

## 9 Contaminants

### 9.1 Heavy metals

Asparagus shall comply with those maximum levels for heavy metals established by the Codex Alimentarius Commission for this commodity. The current levels are as given below:

Heavy metal	Maximum level (mg/kg) wet weight	Standards	Sampling & analysis
Lead (Pb)	0.10	Codex Stan 193	EAS 41
Cadmium (Cd)	0.10	Codex Stan 193	Codex Stan 228

<sup>2</sup> Package units of produce prepacked for direct sale to the consumer shall not be subject to these marking provisions but shall conform to the national requirements. However, the markings referred to shall in any event be shown on the transport packaging containing such package units.

<sup>3</sup> The national legislation of a number of countries requires the explicit declaration of the name and address. However, in the case where a code mark is used, the reference “packer and/or dispatcher (or equivalent abbreviations)” has to be indicated in close connection with the code mark.

## 9.2 Pesticide residues

Asparagus shall comply with those maximum pesticide residue limits established by the Codex Alimentarius Commission for this commodity. The current Codex MRLs are presented below while MRLs applying internationally are given in Annex E.

### Maximum pesticide residue limits and extraneous maximum residue limits in asparagus (current as at 2009-06-09)

Type	Unit symbol	Limit	Method of test	Notes
CARBARYL	mg/kg	15		
CARBENDAZIM	mg/kg	0.2		Source of data: benomyl
DIFENOCONAZOLE	mg/kg	0.03		
DIMETHOATE	mg/kg	0.05(*)		
DISULFOTON	mg/kg	0.02(*)		
DITHIOCARBAMATES	undef	0.1		Source of data: mancozeb
GLUFOSINATE-AMMONIUM	mg/kg	0.05(*)		
MALATHION	undef	1		
METALAXYL	mg/kg	0.05(*)		
METHOMYL	mg/kg	2		
PERMETHRIN	mg/kg	1		
PIRIMICARB	undef	0.01(*)		

## 10 Hygiene

**10.1** It is recommended that the produce covered by the provisions of this Standard be prepared and handled in accordance with the appropriate sections of CAC/RCP 1, CAC/RCP 53, and other relevant Codex texts such as Codes of Hygienic Practice and Codes of Practice.

**10.2** The produce should comply with any microbiological criteria established in accordance with CAC/GL 21.



Figure 1 — White asparagus production

Draft for comments only — Not for publication

East African Standard



Figure 2 — Green asparagus production

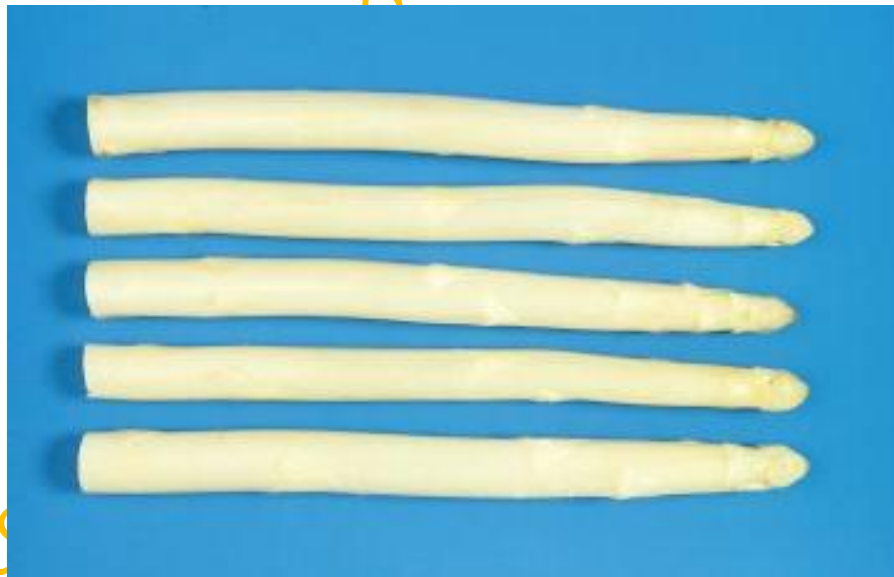


Figure 3 — White asparagus

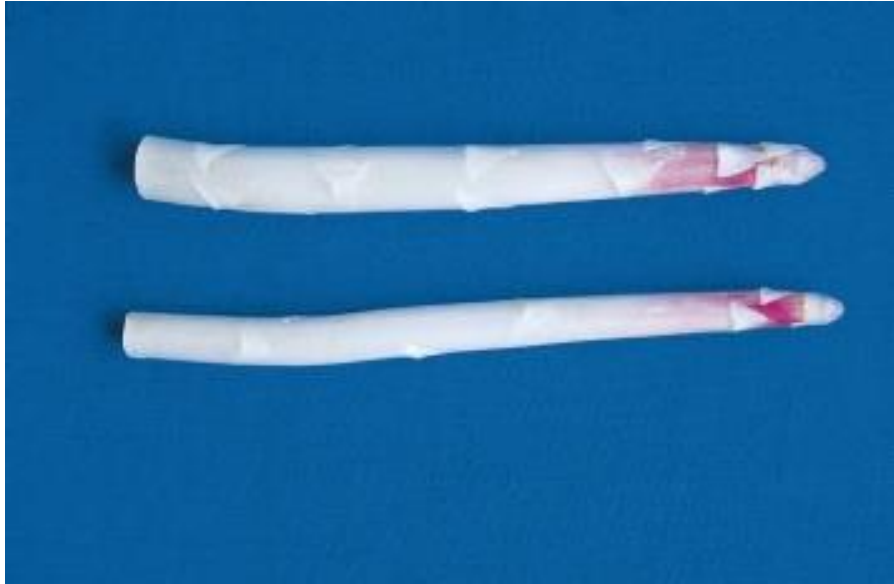


Figure 4 — Violet asparagus



Figure 5 — Violet/green asparagus

Draft for comments



Figure 6 — Green asparagus, fully green



Figure 7 — Green asparagus with violet tips and bracts

Draft for comments

Standard



Figure 8 — Injury due to harvesting — Not allowed



Figure 9 — Bacterial rot — Not allowed

Draft for comments



Figure 10 — Frost damage — White asparagus — Not allowed



Figure 11 — Frost damage — Green asparagus — Not allowed



Figure 12 — Rot on tips — Not allowed



Figure 13 — Soiled shoots — Not allowed

Draft for comments

Standard



Figure 14 — Shrivelled shoots — Not allowed



Figure 15 — Eggs of the asparagus beetle — Not allowed



Figure 16 — Damage caused by larvae — Not allowed



Figure 17 — Not cleanly cut — Not allowed

Draft for comments



Figure 18 — Hollow shoot — Not allowed



Figure 19 — Split shoots — Not allowed

Draft for comments

Standard



Figure 20 — Peeled shoots (highlighted with arrows) — Not allowed



Figure 21 — Broken shoots — Not allowed

Draft for comments

Standard



Figure 22 — Small cracks (only allowed within the quality tolerances) — Not allowed



Figure 23 — Very well formed asparagus

Draft for comments

Standard



Figure 24 — Very compact tips in the case of white asparagus — Minimum required



Figure 25 — Very compact tips in the case of green asparagus — Minimum required

Draft for comments



Figure 26 — Very slight traces of rust — Limit allowed for “Extra” Class



Figure 27 — White asparagus with a faint pink tint on the shoots — Limit allowed for “Extra” Class



Figure 28 — Cut at the base square/less square — Limit allowed for “Extra” Class



Figure 29 — Presentation of asparagus packed in a bundle — Limit allowed for “Extra” Class

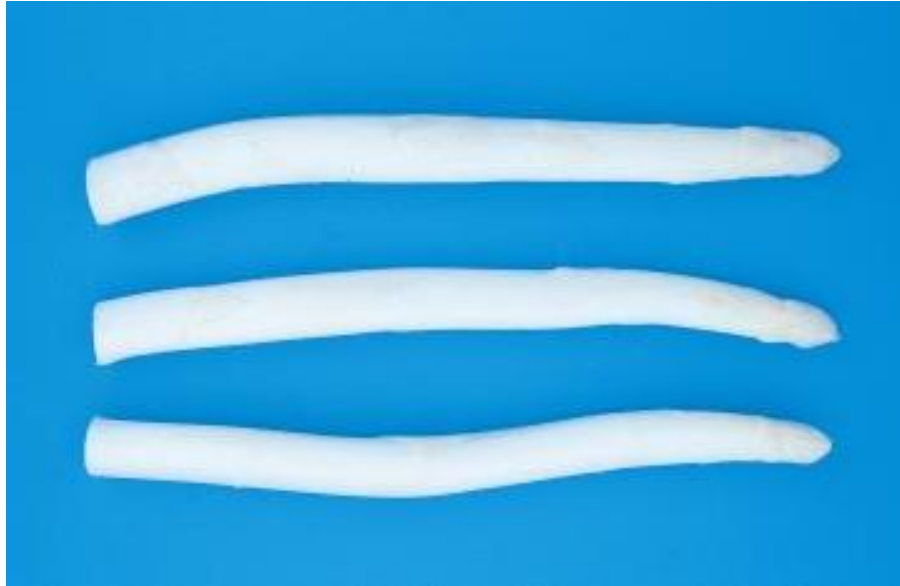


Figure 30 — Slightly curved white asparagus — Limit allowed for Class I



Figure 31 — Slightly curved violet/green and green asparagus — Limit allowed for Class I



Figure 32 — Compact tips in the case of white asparagus — Limit allowed for Class I



Figure 33 — Compact tips in the case of green asparagus — Limit allowed for Class I

Draft for comments



Figure 34 — Slight traces of rust — Limit allowed for Class I



Figure 35 — White asparagus with a faint pink tint on tips and shoots — Limit allowed for Class I

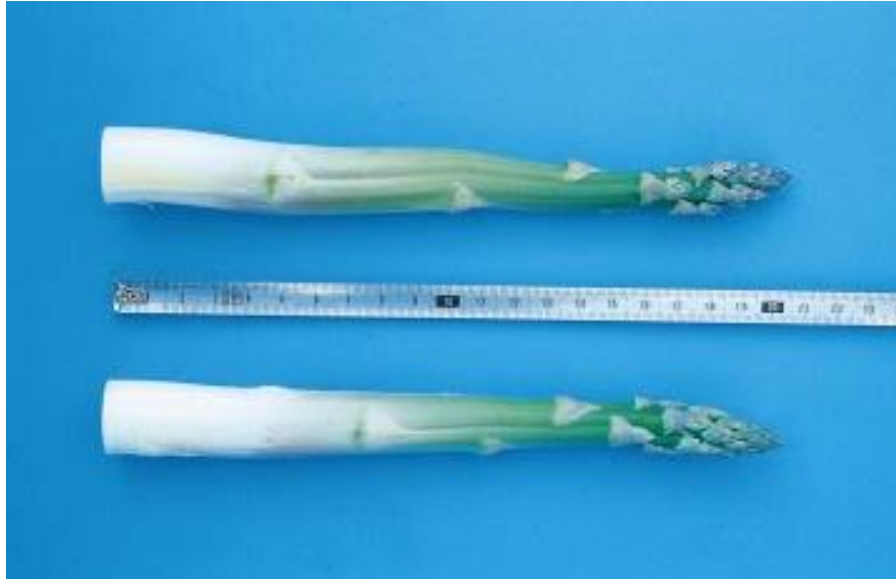


Figure 36 — Green asparagus — Green for 80% of their length — Limit allowed for Class I



Figure 37 — Less well formed in the case of white and violet asparagus — Limit allowed for Class II



Figure 38 — Less well formed in the case of violet/green and green asparagus — Limit allowed for Class II



Figure 39 — Slightly open tips in the case of white asparagus — Limit allowed for Class II



Figure 40 — Slightly open tips in the case of green asparagus — Limit allowed for Class II



Figure 41 — Traces of rust on the shoots — Limit allowed for Class II

Draft for comments



Figure 42 — Traces of rust on the tips — Limit allowed for Class II



Figure 43 — White asparagus with a green tint on the tips — Limit allowed for Class II



Figure 44 — Violet asparagus with a slight green tint on the tips — Limit allowed for Class II



Figure 45 — Green asparagus — Green for 60% of their length — Limit allowed for Class II

Draft for comments



Figure 46 — Cut at the base — Limit allowed for Class II



Figure 47 — How to measure diameter of the shoot

Draft for comments

Standard



Figure 48 — Very careful presentation — “Extra” Class



Figure 49 — Careful presentation — Class I

Draft for comments

Standard



Figure 50 — Suitable presentation — Class II



Figure 51 — Mixture of white and violet asparagus in class II



Figure 52 — Unit packages



Figure 53 — Bundled asparagus

Draft for comments



Figure 54 — Bundled asparagus in a package



Figure 55 — Asparagus arranged (not bundled) in the package



Figure 56 — Asparagus in a punnet



Figure 57 — Example of marking on a label



Figure 58 — Example of marking printed on the package



Draft for comment

Standard



Fresh asparagus



Fresh bunched asparagus

Draft for comments

American Standard



Seeding asparagus



Asparagus in farm

Draft for comment

Standard

## Annex A (informative)

### Guide to storage

#### A.1 Scope

This annex describes methods for obtaining conditions for the successful keeping of shoots of asparagus intended, after storage, either for direct consumption or for industrial processing.

#### A.2 Field of application

This annex provides the storage conditions necessary to keep the quality of the asparagus in order for the product to reach the consumer while fresh.

#### A.3 Conditions of harvesting and putting into store

##### A.3.1 Harvesting

The asparagus shoots should be harvested at a development stage corresponding to the quality requirements specified in the relevant product standard.

##### A.3.2 Quality characteristics for storage

Asparagus shoots intended for storage should appear fresh, and should be clean, sound, firm, smooth, well formed, and free from bruises and visible damage caused by insects or diseases. The heads or tips should be closed.

Shoots of bleached asparagus should be fully etiolated.

According to the cultivar, the head or tip and sometimes the shoot may be white, pale yellow or lilac. The shoots of green asparagus should be uniformly green.

##### A.3.3 Putting into store

The asparagus shoots should be free from earth and other foreign matter. They may be washed if necessary. They should be put into store as soon as possible after harvesting. It is recommended that, to the extent permitted by the prevailing technical conditions, an initial refrigeration be effected to cool the asparagus shoots from field temperature to 7 °C, before they are put into store. This temperature is a transition to subsequent can also be obtained using cold water or ice water; the asparagus shoots should not remain in water for more than 1 h.

Before storage, the asparagus shoots should be layered in boxes, without bundling; they should be put into store in this state (for example, 12 kg of shoots should be put into boxes of 15 kg capacity).

#### A.4 Optimum storage conditions

##### A.4.1 Temperature

Asparagus is a vegetable liable to be damaged by refrigeration; therefore, storage temperature and intended time of storage have to be carefully related.

During storage, the optimum temperature limits for keeping are from +1 °C to +2 °C. The minimum of +1 °C is recommended because fluctuation of temperature may reach 0.5 °C, and practical experience has shown that shoots stored at a temperature below 0.5 °C are likely to be damaged.

## CD/K/037:2010

If the intended period of storage is 10 days or shorter, the asparagus shoots may be kept successfully at 0.5 °C. However, at this temperature the period of 10 days should not be exceeded because of the likelihood of damage.

### A.4.2 Relative humidity

The relative humidity should be kept at 90 to 95 %.

### A.4.3 Air circulation

The boxes and the way in which they are stacked should allow the temperature and relative humidity to be maintained constant and uniform, within the limits mentioned in A.4.1 and A.4.2, by air circulation.

### A.4.4 Storage life

It is recommended that asparagus shoots be stored for as short a period as possible. According to the cultivar, the quality and the temperature, the asparagus shoots should not be stored for longer than 10 to 20 days (time required for refrigerated transport and for distribution included).

Draft for comments only — Not to be cited as East African Standard

## Annex B (informative)

### Guide to refrigerated transport

#### B.1 Scope

This annex describes methods for obtaining conditions for the successful long distance transport of shoots of asparagus, intended either for direct consumption or for industrial processing.

It is not applicable to transportation over short distances or by air; in these cases, refrigeration does not govern the quality.

#### B.2 Field of application

This annex provides the cooling conditions necessary to keep the quality of the asparagus in order for the product to reach the consumer while fresh.

#### B.3 Preparation of the asparagus shoots for transport

##### B.3.1 Harvesting

Asparagus should be harvested at a development stage corresponding to the quality requirements specified in the relevant product standards. They should have closed heads and tips.

##### B.3.2 Cleaning, cooling, packing

Asparagus shoots should be free from earth and sand. They may be washed if necessary. Asparagus is a highly perishable vegetable and if good quality is to be maintained it should be cooled as soon as possible after harvest to a temperature of +7 °C or below. This precooling can be accomplished by hydrocooling to +5 °C and then placing in refrigerated storage at +1 °C to +2 °C. Refrigerated storage eliminates surface moisture. Precooling can also be accomplished by placing the asparagus shoots into store at +1 °C to +2 °C as soon as possible after harvest. Rapid cooling is critically important. After precooling, the product can be submitted to grading and packing operations, according to marketing requirements. Asparagus is rarely stored except for short holding periods. The temperature can range from 0 to +5 °C. When transported over long distances, the temperature of the product should be +1 °C to +2 °C at the outset.

Containers should be clean and free from dirt. The packing material should be new and should not contain any material harmful to humans. The packing should be such as to safeguard the quality of the asparagus. The cut ends of the bundled shoots may be wrapped in tissue-paper or the bundles may be placed in perforated plastic bags.

The relative humidity required during transport, i.e. 95 %, can only be maintained if containers holding the shoots are lined with perforated parchment paper or plastic film, or if waxed cardboard containers lined with plastic film are used. The shoots may be layered either with or without bundling. Completely closed containers or plastic bags preventing ventilation should not be used as uncontrolled build up of carbon dioxide and depletion of oxygen may cause damage to the shoots. The size of wooden or cardboard boxes should be sufficient for the shoots in bundles, but should prevent them from moving inside during transit.

#### B.4 Transport

##### B.4.1 Optimum conditions for transport

At temperatures of +1 °C and +2 °C and at a relative humidity of 95 %, the asparagus shoots can only be kept for a maximum of three weeks in a condition suitable for consumption. During transport therefore, these conditions need to be very carefully controlled, or if this is not possible, the length of

time from harvest to consumption should be as short as possible. During transit over 2 to 3 days, fluctuations of temperature between +1 °C and +5 °C are permissible, as these will not affect the quality.

To maintain the relative humidity, the method of packing described should be adequate. At higher temperatures or at low relative humidities arising from inadequate packing, the quality of the asparagus shoots quickly deteriorates during transit (toughening, decay, bacterial rot, process of senescence).

#### **B.4.2 Means of transport**


Refrigeration should be continuous for the asparagus. For this purpose, ice- or mechanically refrigerated railway trucks or refrigerated lorries may be used.

The vehicles and equipment used for transport shall not have previously carried material harmful to health (chemical substances, plant protection materials, fertilizers). It should be in good working condition i.e. fans should be operating, drains should be free within ice-refrigerated railway trucks and floor racks ensuring air circulation should be in position. Before loading, the loading space of the vehicles should be precooled either by icing the bunkers or by mechanical refrigeration.

Draft for comments only — Not to be cited as EAC African Standard

**Annex C**  
(informative)

**Model certificate of conformity with standards for fresh fruits and vegetables**

1. Trader:	Certificate of conformity with the Community marketing standards applicable to fresh fruits and vegetables  No. ....  (This certificate is exclusively for the use of inspection bodies)		
2. Packer identified on packaging (if other than trader)	3. Inspection body		
	4. Place of inspection/country of origin <sup>(1)</sup>	5. Region or country of destination	
6. Identifier of means of transport	7. <input type="checkbox"/> Internal <input type="checkbox"/> Import <input type="checkbox"/> Export		
8. Packages (number and type)	9. Type of product (variety if the standards specifies)	10. Quality Class	11. Total net weight in kg
<p>12. The consignment referred to above conforms, at the time of issue, with the Community standards in force, vide:</p> <p><u>CD/K/037:2010, Fresh asparagus — Specification and grading</u></p> <p>_____</p> <p>Customs office foreseen ..... Place and date of issue .....</p> <p>Valid until (date): .....</p> <p>Signatory (name in block letters): .....</p> <p>Signature <span style="margin-left: 200px;">Seal of competent authority</span></p>			
13. Observations:			
<p>(1) Where the goods are being re-exported, indicate the origin in box 9.</p>			

## Annex D (informative)

### Asparagus — Fact sheet

#### D.1 Botany

Asparagus is a perennial crop that can remain commercially productive for 10 to 15 years. The plant is composed of ferns, a crown, and the root system. The fern is a photosynthetically active modified stem. The crown is a series of rhizomes (underground root-like stems) attached to the base of the main plant. New crown buds, from which spears (immature ferns) arise, are formed the previous year. Larger buds generally result in larger spears, while smaller buds yield small spears. Bud size is most influenced by the plant's overall vigor the previous year. Growing conditions that favor healthy fern development and the accumulation of carbohydrates (food reserves) in the crown and root system thus enhance size and vigor of buds and subsequent spears.

Asparagus has an extensive root system comprised of fleshy storage roots and finer feeder roots. The mature asparagus plant's root system can reach 1.5–3 m deep and 3–3.6 m wide. Storage roots attached to the crown that store carbohydrates are the diameter of a pencil. Fibrous feeder roots develop from storage roots to accumulate nutrients and absorb moisture.

Asparagus has separate male and female plants. Open-pollinated varieties (non-hybrid varieties allowed to cross-pollinate freely) produce almost equal numbers of male and female plants. The plant's sex has a pronounced effect on the quality and quantity of spears and on crop management practices. Female plants produce larger diameter spears, but lower yields. They also produce seed that can become a serious weed problem for the established stand if allowed to germinate and establish. Lower yields for females are probably caused by energy used for seed production at the expense of carbohydrate accumulation that could be used for subsequent spear production. Male plants have higher yields, live longer, begin to produce earlier, and do not produce seed.

#### D.2 Climate

Asparagus grows best when growing conditions include high light intensity, warm days, cool nights, low relative humidity, and adequate soil moisture. Compared to most other vegetables, asparagus is relatively hardy to cold, with higher heat, drought, and salt tolerances.

Spear initiation and root growth begin when the soil temperature is above 10 °C. Sandy soils warm earlier in the spring and encourage early spear production, while irrigation cools the soil and retards spear production. Optimum productivity occurs at 24–29.4 °C in the day and 13–19 °C at night. High daytime temperatures during harvest will loosen the spear tip and develop fiber in the stem, both of which reduce crop quality.

High winds and abrasion caused by windborne soil particles can cause considerable damage to growing asparagus spears, causing the spear tips to curve into the wind. If curving is excessive, the spear becomes a cull. Windbreaks and grain cover crops can reduce wind damage, particularly on sandy sites.

#### D.3 Soils

Asparagus grows in a wide range of soils, ranging from pure sand to heavy clays and mucks. An ideal site includes a sandy loam soil with good drainage and aeration, water table below 1.2 m, and a pH of 6.8–7.5.

#### D.4 Site preparation

Avoid sites with established perennial weeds, particularly bindweed and nutsedge, which are persistent and difficult to control.

Planting sites should be deeply plowed, disked, and laser-leveled if flood irrigation is to be used. Organic matter should be incorporated 6 months before planting to allow the material to break down. These materials are not essential, but can be used if they are readily available.

#### **D.5 Variety selection**

Select varieties that are adapted to local growing conditions. Quality, yield, earliness of production, aggressiveness of plants, and disease tolerance are all important variables to consider. Several hybrid asparagus varieties are being developed to replace the industry's standard open-pollinated varieties. Hybrid seed is more expensive than older open-pollinated varieties, but yields are often higher and most offer greater resistance to diseases.

#### **D.6 Planting techniques**

While the accepted methods of planting asparagus employ either crowns or transplants, crowns are traditionally used. Growers using crowns should buy medium to large grades that are disease free and locally adapted from a reputable asparagus nursery. If crowns cannot be planted immediately, they should be stored in a cool (1.7–4 °C), moderately dry environment to maintain their viability. Avoid drying, high temperatures, and freezing. Schedule delivery of crowns to coincide with planting to avoid prolonged crown storage.

To ensure rapid establishment, plant crowns after the soil temperature has reached 10 °C.

Place crowns in the bottom of the furrow with buds facing up, then cover with 5–7 cm of soil. Crowns planted without proper bud orientation will survive, but will emerge more slowly, resulting in lower yields. Crowns planted with buds facing down also tend to push to the surface of the soil.

When crowns are planted and covered, apply irrigation water to settle the soil and provide soil moisture for growth and crown development. Furrow irrigation can be used as long as erosion is avoided. If sprinkler or drip irrigation is used, make sure the ground is thoroughly soaked to a depth of 0.3–0.6 m.

After emergence, apply additional nitrogen (34 kg/ac). Gradually add more soil to the crowns as ferns develop. Furrows should be filled in by the end of the first growing season.

Seedling transplants are increasingly replacing crowns as the preferred planting method. Field-ready transplants grown in a greenhouse can be ready for transplanting in 10 weeks, versus one year for a crown. Transplants also eliminate digging injuries associated with crowns.

Water transplants thoroughly before planting in the field. Plant in the center (bottom) of the planting furrow. Soil should be added gradually to the furrow as spears develop into mature ferns. Land preparation, planting depth of the transplant's crown, spacing, fertilization, and irrigation recommendations are the same for transplants as for crown plantings.

Another transplant technique is the use of a double row configuration. This requires twice as many plants, but results in greater yields, especially early in the planting.

Double-row management requires a wider furrow, with centers 1.5 m apart. Plant transplants on both sides of the furrow so the rows are 0.3 m apart, allowing 0.3 m between plants within the row. All other establishment techniques are the same as for the single-row transplant.

#### **D.7 Fertilizer requirements**

Soil and plant tissue should be analyzed yearly to provide the grower with specific information on nutrient status of the soil and the plants in the field.

Micronutrients, specifically iron and zinc, may also be required, as these nutrients can become unavailable for plant uptake on highly alkaline soils. Iron deficiency symptoms include chlorosis, or yellowing, of the new growth. In severe cases, growing tips will appear white. Foliar applications of ferrous sulfate should be made as soon as symptoms appear.

Zinc deficiency symptoms are similar to iron, causing stunting and yield reductions. Foliar applications of zinc sulfate should be made as soon as zinc deficiency is identified, or if plants do not respond to corrective iron sprays.

#### **D.8 Irrigation**

Furrow, sprinkler, or drip irrigation can be used to maintain asparagus plants. Irrigation schedules will depend upon local weather conditions, soil textures, and current stage of growth. Irrigate fields often enough to maintain good soil moisture and vigorous fern growth during the growing season. No irrigation is needed during the dormant period.

Increase irrigation frequency as ferns begin to develop. Overhead sprinkler irrigation should be applied in the morning to avoid foliar disease such as asparagus rust and Cercosporia, and possible salt injury.

#### **D.9 Dormant season management**

Remove ferns when they are completely dormant and brown. Removing ferns makes harvesting easier later on and reduces sites for insects and diseases. Ferns can either be burned, mowed, or baled.

Before spear emergence, lightly rototill the beds to remove any remaining fern material. Be careful not to damage crowns under the soil surface. A layer of soil 5–8 cm deep should then be added to the tops of the beds with a border disk. The rototilling and extra soil makes harvesting easier, creating a clean bed. The additional soil also tends to increase spear diameter.

#### **D.10 General pest management**

Pests in asparagus plantings include weeds, insects, and diseases. It is important to identify and know the life cycle of the pest that is present. Control measures include varietal resistance or tolerance, cultural practices, and chemical controls, and every effort should be made to minimize pesticide use. However, when no other management technique can prevent unacceptable crop losses, labeled pesticides may be used. Always read and follow label directions and check with agricultural extension workers for the latest recommendations for pest control.

#### **D.11 Weed control**

Shallow cultivation can be used on tops of beds in early spring before spears emerge if the cultivator does not damage crowns. Sweeps can be used to clean furrows, if they are set to avoid root damage. Herbicides can also be used to control specific weeds.

#### **D.12 Insects**

Common insect pests on asparagus include the asparagus aphid, asparagus beetles, and cutworms. Asparagus aphids, a powdery gray-green aphid, damage the fern by injecting toxins into the plant while feeding. The toxins will stunt the fern and cause abnormal growth.

Two types of beetles feed on asparagus: the common asparagus beetle and the spotted asparagus beetle. Both species feed on foliage and reduce asparagus quality by depositing eggs on emerging spears (appearance problem).

Adult common asparagus beetles are 6.35 mm long, brightly colored beetles. The wings are black with red margins and three large, yellow-squarish spots. The blue-gray larvae have black heads. Asparagus spears with beetle eggs are considered culls, as the larvae feed on the ferns and reduce their ability to produce carbohydrates.

The adult spotted asparagus beetle is the same size as the common asparagus beetle, but its wings are covered with six reddish-orange spots. Larvae are orange. This beetle mostly damages the seed berry, but it also may be present on the ferns and spears.

Control of both species includes removal of the old ferns where these pests settle, and use of labeled insecticides.

Cutworms can also damage asparagus spears. Cutworms feed on the spear tip or on the side of the spear. This brown to pale yellow larva lives in the soil and can be up to 5 cm long. Because adult cutworm moths usually lay eggs on weeds, good weed control reduces cutworm populations.

### D.13 Diseases

Common asparagus diseases include Fusarium wilt, asparagus rust, and Cercospora needle blight. Fusarium wilt is a destructive disease with no known treatment for infected plants. This disease is caused by soil-borne fungi that cause plants to lose vigor and die. Infection can occur through wounds caused by insects, cultivation, or harvesting, or through root tips. Symptoms include shriveling spears or yellowing ferns, and eventual dead ferns. Infected roots are reddish-brown.

Crowns eventually turn reddish-brown, rot, and die. To control Fusarium wilt, avoid planting in land where asparagus previously grew, plant resistant varieties, and avoid stressing or damaging plants.

Asparagus rust and Cercospora needle blight are potential problems in prolonged, rainy weather. Asparagus rust is caused by a fungus that infects ferns after harvest. Extensive infection reduces the fern's ability to produce carbohydrates, causing an overall decline in crown vigor. Reddish-brown pustules on ferns indicates the fungus is present. Spores are spread by wind and rain. Control measures include resistant varieties and preventive chemical sprays.

Cercospora needle blight is also caused by a fungus. Its symptoms occur midway through the growing season, causing ferns to die prematurely. Infected ferns are characterized by small, tan to gray, oval or elliptic spots with reddish-brown margins.

Premature plant defoliation at this crucial time will reduce carbohydrate accumulation. The fungus can spread quickly under conditions of high rainfall and humidity. A registered, preventive fungicide should help control this disease.

### D.14 Harvesting

Asparagus spear production depends on carbohydrates stored in the crown from the previous season, as sufficient stored carbohydrates are necessary after harvest to produce vigorous ferns. To have healthy, productive plants the following year, avoid excessive harvesting. When average spear groundline diameter declines to 6.35 mm, harvest should be stopped and plants allowed to produce ferns to replenish carbohydrates for the next season.

The harvest interval is usually three times/week early in the season when soil and air temperatures are low. Daily harvesting is possible toward the end of the season as temperatures warm.

Asparagus can either be snapped or cut with a special long-handle knife. Snapping asparagus is faster than cutting asparagus and gives completely tender spears. Cutting asparagus results in greater yields because spears are cut 2.5–5 cm below ground. The bottom of the spear will, however, be white and partially lignified. Harvesters should avoid damaging crowns with the harvesting knives. Harvest asparagus early in the day while the spears are still cool, and refrigerate as soon as possible after cutting.

Harvest duration depends on method of establishment, overall plant vigor, and age of planting. Where the growing season is longer, one-year-old established plants from crowns can be lightly harvested the first year after planting. This harvest can last up to three weeks, assuming stem diameters are not less than an average of 6.35 cm.

Do not harvest transplants the first year after planting, but both crown and transplant asparagus can be lightly harvested the second season. For the next two years, harvest up to eight weeks. From year four on, harvest a maximum of 10 weeks/year. Pick the field clean so none of the spears develop into ferns during the harvest season. Early fern production attracts insects and disease problems and

depletes food reserves needed for additional spear production. Harvest duration will depend upon the vigor of the plants the previous season. **Do not** overharvest and weaken plants if you want to maintain long-term viability of the planting.

**D.15 Grading**

Most fresh market asparagus is Grade I meeting the requirements outlined in Clause 4.3. There are four major wholesale shipping container types: loose pack pyramid, half-pyramid crate, carton, and pyramid wire bound crate. The loose pack pyramid crate has a wet absorbing pad on the bottom to help maintain spear turgor. Its net weight is 14.5 kg. The half-pyramid crate is similar, except its net weight is 6.75–7.75 kg. The carton can hold 16 × 0.675 kg bunches. The pyramid wire-bound crate holds 12 bunches, net weight 14.5 kg.

**D.16 Storage**

Asparagus is highly perishable and should be cooled as soon as possible to maintain quality. Asparagus can be hydrocooled with ice water and put into cold storage. Optimum storage temperature is 0–2 °C at 95% relative humidity, making storage of two to three weeks possible. Storage below optimum temperatures can lead to limp, mushy, discolored spears. Storage above optimum temperatures will result in partially open bracts and potential disease and rot problems. Phytophthora, Botrytis, and Fusarium rots can all occur when asparagus is stored at temperatures above the optimum range. Details of storage conditions are provided in Annex A.

Draft for comments only — Not to be cited as East African Standard

## Annex E (informative)

### Asparagus — Codex, EU and USA pesticide residue limits

Users are advised that international regulations and permissible Maximum Residue Levels (MRL) frequently change. Although this International MRL Database is updated frequently, the information in it may not be completely up-to-date or error free. Additionally, commodity nomenclature and residue definitions vary between countries, and country policies regarding deferral to international standards are not always transparent. This database is intended to be an initial reference source only, and users must verify any information obtained from it with knowledgeable parties in the market of interest prior to the sale or shipment of any products. The developers of this database are not liable for any damages, in whole or in part, caused by or arising in any way from user's use of the database.

#### Results Key

MRL values in *(Italics)* are more restrictive than US

--- indicates no MRL value is established.

Cod, EU, etc. indicates the source of the MRL and EXP means the market defers to the exporting market.

All numeric values listed are in parts per million (ppm), unless otherwise noted

	US	Cod	EU 1
<b>2,4-D</b>	5	---	<i>{0.05}</i>
	1. European Union does not maintain a specific MRL for the 2,4-D/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU
<b>Azoxystrobin</b>	0.04	---	0.05
	US	Cod	EU
<b>Carbaryl</b>	15	15	<i>{0.05}</i>
	US	Cod	EU
<b>Chlorothalonil</b>	0.1	---	<i>{0.01}</i>
	US	Cod	EU 2
<b>Clethodim</b>	1.7	---	<i>{0.5}</i>
	2. European Union does not maintain a specific MRL for the Clethodim/Asparagus combination, but does maintain an MRL of 0.5 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 3
<b>Clopyralid</b>	1	---	<i>{0.5}</i>
	3. European Union does not maintain a specific MRL for the Clopyralid/Asparagus combination, but does maintain an MRL of 0.5 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU
<b>Dicamba</b>	4	---	<i>{0.1}</i>
	US	Cod	EU
<b>Diuron</b>	7	---	<i>{2}</i>
	US	Cod	EU 4
<b>EPTC</b>	0.1	---	<i>{0.05}</i>
	4. European Union does not maintain a specific MRL for the EPTC/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 5
<b>Fenhexamid</b>	0.02	---	0.05
	5. European Union does not maintain a specific MRL for the Fenhexamid/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 6
<b>Flumioxazin</b>	0.02	---	0.05
	6. European Union does not maintain a specific MRL for the Flumioxazin/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		

	US	Cod	EU 7
<b>Glyphosate</b>	0.5	---	{0.1}
	7. European Union does not maintain a specific MRL for the Glyphosate/Asparagus combination, but does maintain an MRL of 0.1 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 8
<b>Halosulfuron-methyl</b>	0.8	---	{0.01}
	8. European Union does not maintain a specific MRL for the Halosulfuron-methyl/Asparagus combination, but does maintain an MRL of 0.01 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU 9
<b>Inorganic bromide resulting from fumigation</b>	100	---	{30}
	9. European Union does not maintain a specific MRL for the Inorganic bromide resulting from fumigation/Asparagus combination, but does maintain an MRL of 30 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU
<b>Linuron</b>	7	---	{0.05}
	US	Cod	EU 10
<b>Malathion</b>	8	{1}	{0.02}
	10. European Union does not maintain a specific MRL for the Malathion/Asparagus combination, but does maintain an MRL of 0.02 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod 11	EU
<b>Mancozeb</b>	0.1	0.1	0.5
	11. The MRL is established for the sum of dithiocarbamates.		
	US	Cod	EU 12
<b>Mesotrione</b>	0.01	---	0.05
	12. European Union does not maintain a specific MRL for the Mesotrione/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU
<b>Metalaxyl</b>	7	{0.05}	{0.05}
	US	Cod 13	EU 14
<b>Methomyl</b>	2	2	{0.05}
	13. The MRL is established for the sum of methomyl and thiodicarb. 14. Methomyl and Thiodicarb (sum of methomyl and thiodicarb expressed as methomyl) European Union does not maintain a specific MRL for the Methomyl/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 15
<b>Metribuzin</b>	0.1	---	0.1
	15. European Union does not maintain a specific MRL for the Metribuzin/Asparagus combination, but does maintain an MRL of 0.1 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU
<b>Myclobutanil</b>	0.02	---	0.02
	US	Cod	EU 16
<b>Napropamide</b>	0.1	---	{0.05}
	16. European Union does not maintain a specific MRL for the Napropamide/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU
<b>Norflurazon</b>	0.05	---	---
	US	Cod	EU 17
<b>Paraquat dichloride</b>	0.5	---	{0.02}
	17. European Union does not maintain a specific MRL for the Paraquat dichloride/Asparagus combination, but does maintain an MRL of 0.02 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU
<b>Pendimethalin</b>	0.15	---	{0.05}

	US	Cod	EU 18
<b>Permethrin</b>	2	{1}	{0.05}
	18. European Union does not maintain a specific MRL for the Permethrin/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU 19
<b>Pymetrozine</b>	0.04	---	{0.02}
	19. European Union does not maintain a specific MRL for the Pymetrozine/Asparagus combination, but does maintain an MRL of 0.02 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 20
<b>S-metolachlor</b>	0.1	---	{0.05}
	20. European Union does not maintain a specific MRL for the S-metolachlor/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Vegetables Fresh or Frozen" group.		
	US	Cod	EU 21
<b>Sethoxydim</b>	4	---	{0.5}
	21. European Union does not maintain a specific MRL for the Sethoxydim/Asparagus combination, but does maintain an MRL of 0.5 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 22
<b>Spinetoram</b>	0.04	---	0.05
	22. European Union does not maintain a specific MRL for the Spinetoram/Asparagus combination, but does maintain an MRL of 0.05 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU
<b>Spinosad</b>	0.2	---	0.2
	US	Cod	EU
<b>Sulfentrazone</b>	0.15	---	---
	US	Cod	EU
<b>Tebuconazole</b>	0.05	---	0.05
	US	Cod	EU
<b>Terbacil</b>	0.4	---	---
	US	Cod	EU 23
<b>Trifloxystrobin</b>	0.07	---	{0.02}
	23. European Union does not maintain a specific MRL for the Trifloxystrobin/Asparagus combination, but does maintain an MRL of 0.02 PPM for its "Stem vegetables (fresh)" group.		
	US	Cod	EU 24
<b>Trifluralin</b>	0.05	---	0.5
	24. European Union does not maintain a specific MRL for the Trifluralin/Asparagus combination, but does maintain an MRL of 0.5 PPM for its "Stem vegetables (fresh)" group.		

*Draft for comments only — Not to be cited as East African Standard*

*Draft for comments only — Not to be cited as East African Standard*