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EAST AFRICAN STANDARD

Seed potatoes — Specification and grading

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 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.

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Introduction

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

United States Standards for Grades of Seed Potatoes, Effective March 6, 1987 *(Reprinted — January 1997)*

UNECE Standard S-1:2008, *Marketing and commercial quality control of seed potatoes*

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 Alimentarius website: 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

European Union: 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

Fresh seed potatoes — Specification and grading

1 Goal and scope

1.1 Goal

The goal of this East African Standard is to act as a reference intended to facilitate fair regional trade by:

— Creating a harmonized certification system

— Promoting its use

— Defining harmonized quality requirements for seed potatoes.

1.2 Scope

To reach the aforementioned goal the Standard covers the following requirements controlled by certification:

— Varietal identity and purity

— Genealogy and traceability

— Diseases and pests

— External quality and physiology

— Sizing and labelling.

As a consequence, this Standard considers issues falling under the WTO-TBT agreement as well as under the WTO-SPS agreement.

2 Description and application

2.1 Seed potatoes are tubers or any other propagation material, other than true seed, of *Solanum tuberosum L*. acceptable for certification by the Designated Authority (DA) in accordance with the provisions concerning the variety (see Clause 4) and which, after regular inspection

1. During growth
2. At sorting
3. During verification inspection

are certified by an officially approved body as suitable for reproduction.

2.2 This Standard does not apply to seed potatoes

1. Intended for trials or scientific purposes
2. Intended for selection work.

These, however, shall always be covered by documentary confirmation of quality by the DA.

3 Definitions

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

3.1
blackleg
Commonly used name of a bacterial disease of potatoes, generally caused by *Pectobacterium atrosepticum* (syn. *Erwinia carotovora* subsp. a*troseptica*). Similar symptoms may, however, be caused by *Pectobacterium carotovorum* (formerly *E*. *carotovora* subsp. *carotovora*) and *Dickeya* spp. (syn. *E. chrysanthemi*).

3.2
certification
An official control procedure, which aims at ensuring the production and supply of seed potatoes which satisfy the requirements of this Standard.

3.3
condition defects
defects which may develop or change during storage or shipment

3.4
consignment
A quantity of seed potatoes consisting of one or more lots which have been consigned to one commercial party and is covered by one set of documents.

3.5
contaminated field
A field made subject to regulatory action because of the presence of a designated pathogenic organism in the soil.

3.6
damage
any defect or any combination of defects which materially detracts from the internal or external appearance of the potato, or any external or internal defect which cannot be removed without a loss of more than 5 percent of the total weight of the potato

3.7
damage by soil
caked soil covers more than 25 percent of a potato's surface

3.8
Designated Authority (DA)
Organization(s), agency or agencies designated and empowered by legislation to administer the certification of seed potatoes under the Standard.

3.9
disease
Any disturbance of a plant caused by pathogenic organisms which interferes with its normal structure, function or economic value.

3.10
Fairly well shaped
the potato is not materially pointed, dumbbell-shaped or otherwise materially deformed

3.11
Nematode or Tuber Moth injury
the presence of, or any evidence of, Nematode or Tuber Moth

3.12
soil
(1) Fairly clean
means that at least 90 percent of the potatoes in the lot have no more than 10 percent of the surface covered with caked soil.

(2) Loose soil

A lot of seed potatoes is not considered damaged by the presence of loose soil, clods, rocks, vines, and foreign material, but such will be considered a tare factor if the following allowances are exceeded:

8 ounces (226.80 g) in a 100 pound (45.3 kg) container.
4 ounces (113.40 g) in a 50 pound (22.65 kg) container.
2 ounces (56.70 g) in a 25 pound (11.33 kg) container or less.
1 percent in a bulk load.

3.13
shriveling
the individual potato is more than moderately shriveled, spongy or flabby

3.14
freezing injury
the potato is frozen or shows evidence of having been frozen

3.15
soft rot or wet breakdown
any soft, mushy or leaky condition of the tissue

3.16
Zero Tolerance" (0.00)
none found during the normal inspecting procedures. Certification of a lot is not a guarantee that the lot inspected is free of a zero tolerance disease or injury.

3.17
serious damage
any defect or any combination of defects which seriously detracts from the internal or external appearance of the potato, or any internal or external defect which cannot be removed without a loss of more than 10 percent of the total weight of the potato.

3.18
external defects
defects which can be detected by examining the surface of the potato. Cutting may be required to determine the extent of the injury

3.19
internal defects
are defects which cannot be detected without cutting the potato

3.20
permanent defects
defects which are not subject to change during storage or shipment

3.21
Field
A defined area of land used for cultivation of seed potatoes.

3.22
Free from
Not present in numbers or quantities that can be detected by the application of appropriate sampling, inspection and testing procedures.

3.23
Generation number
The generation number is defined by the number of growing cycles since the first introduction in the field after micropropagation or selection.

3.24
Homogeneous
Uniform in composition and appearance.

3.25
Initial stock
The initial pathogen-tested microplants produced and maintained under an official control programme.

3.26
Inspection
Visual examination of plants, tubers, container, equipment or facilities by an authorized person, to determine compliance with regulations.

3.27
lot
A quantity of seed potatoes bearing the same reference number which has been prepared for marketing, and being of the same variety, category, class, size and origin.

3.28
Mild virus diseases
Diseases which manifest themselves only by leaf discolorations or mottle (mild mosaic) and may not be easily discernible by visual inspection. The following viruses are usually the causes of mild virus diseases: PVX or PVS.

3.29
Origin
Officially defined area where a lot of seed potatoes was grown.

3.30
Phytosanitary provisions
Provisions in accordance with the International Plant Protection Convention.

Potato leaf roll disease
A severe virus disease caused by potato leaf roll virus (PLRV). Plants are usually smaller than healthy plants and sometimes stunted. The top of the plant is paler and the leaves are more erect than usual. Older lower leaves roll upward and become brittle, such that they can be easily broken (metallic rustling) when squeezed gently. Primary infection may cause a slight rolling of the upper leaves, sometimes accompanied by discoloration.

3.31
Primary virus infection
Infection occurring during the current growing season and not arising from the seed tuber.

3.32
Quality
The sum of all characteristics that determine the acceptance of seed potatoes in relation to the specifications of this Standard.

3.33
Quality Control
The control by the DA of all activities encountered in the process of producing and marketing seed potatoes in conformance with the Standard.

3.34
Quality pest
A pest carried by planting material, subject to official regulatory control, but not a quarantine pest.

3.35
Quarantine pest
A pest of potential national economic importance to the country thereby endangered and not yet present there, or present but not widely distributed and being actively controlled.

3.36
Regulated non-quarantine pest
A non-quarantine pest whose presence in plants for planting affects the intended use of these plants with an economically unacceptable impact and which is therefore regulated within the territory of the importing part.

3.37
Sampling
The procedure of drawing at random a number of tubers, plants or parts of plants, which may be taken as representative of the lot or the field.

3.38
Seed Potatoes
Tubers which are certified by the DA as meeting specified requirements and as being suitable for reproduction.

3.39
Severe Mosaic
Disease symptom caused by a virus, characterized by discolouration and distortion of foliage, and easily discernible by visual inspection.

3.40
Severe virus diseases
Manifest themselves by deformations of the foliage with or without discolouration. Symptoms can be rugosity, crinkle, rolling and brittleness of the leaves or dwarfing of the plant, as with the severe mosaic or/and the potato leaf roll disease.

The following viruses or virus combinations are usually the origin of severe virus diseases:

PLRV, PVY, PVA or PVM,
PVY + PVX, PVA + PVX or PVX + PVS.

3.41
Sprout inhibitor
A chemical substance, applied either to the plants during the growing season or to the tubers after harvest, which suppresses or prevents the normal development of sprouts.

3.42
Substantially free
Not present in numbers or quantities in excess of those that can be expected to result from and be consistent with normal handling and good cultural practices employed in the production and marketing of the commodity.

3.43
Testing
The use of one or more procedures, other than inspection for determining the presence of a pathogenic agent or for varietal identification.

3.44
Traceability
A system of documentation that enables the source and performance of a lot to be tracked during the classification process.

4 Provisions concerning the variety

Varieties shall be accepted into the Standard only if an official description and a reference sample are available from the DA.

The variety should be distinct, uniform and stable according to the guidelines of the International Union for the Protection of New Varieties of Plants (UPOV) and have a denomination allowing its identification.

5 Provisions concerning quality

The purpose of the Standard is to define the quality requirements of seed potatoes at the export control point, after preparation and packaging.

5.1 Minimum requirements

Seed potatoes shall be substantially free from injurious diseases and pests and from any defects likely to impair their quality as seed. They shall be substantially dry outside and, in general, of normal shape for the variety.

These requirements shall be observed in conjunction with the standards and tolerances set out under 5.2 on Classification.

Neither growing crops of seed potatoes nor seed potatoes shall be treated with sprout inhibitors.

5.2 Classification

Seed potatoes shall be classified according to variety and the standards given below. Their classification shall be subject to official control in the producing country. The DA is responsible for the maintenance of all classification data to provide traceability. Seed potatoes shall be placed in two classes within each of three categories as defined below:

5.2.1 Pre-basic category seed

These are seed potatoes of generations prior to basic seed.

(a) Pre-basic TC (tissue culture) class seed shall be directly derived by micropropagation and may be tissue culture plantlets or tubers of the first generation meeting the requirements specified in annexes A, B, C and D.

(b) Pre-basic class seed shall be generations of seed multiplied in the field prior to Basic seed, meeting the requirements specified in annexes B, C and D.

5.2.2 Basic category seed

These are seed potatoes descended directly from Pre-basic or Basic category seed or produced under the special provisions of a national certification scheme and are mainly intended for the production of certified seed potatoes.[1]

Seed shall be classified as either Basic I or Basic II, according to the minimum requirements given in Annexes B, C and D.

5.2.3 Certified category seed

These are seed potatoes descended directly from Pre-basic, Basic or Certified category seed and are mainly intended for the production of potatoes other than seed potatoes.

Seed shall be classified as either Certified I or Certified II, according to the minimum requirements given in Annexes B, C and D.

5.2.4 Field generation

[1] The representatives of the European Commission and France reserved their position on this issue.

Each class may be additionally classified according to the number of generations (FG1, FG2 etc.). The final designation of a class will therefore contain a class name and may contain a field generation record (e.g. Basic I FG3, Certified I FG3).

5.3 Derogation from classification

Producing countries are, however, free to create within the categories and classes provided for in subsection B, classes which are subject to specific requirements.

5.4 Sampling

Sampling of seed potatoes for certification purposes shall be carried out officially or under official supervision. To assess compliance with Annex III, tuber samples, representative of the lot, shall be taken at a minimum rate of 20 kg for each 10 000 kg and may be collected either during grading or from at least two containers. More samples may be taken if one of the initial samples is close to tolerance.

5.5 Comparative trials

It is recommended that comparative trials be established by the DA to ascertain the condition of seed potatoes certified according to the Standard, taking into account statistical variability outlined in Annex H. The guidelines for organizing such trials, set out in Annex F, should be followed.

The results of such trials shall be treated in confidence, but on request the results relating to individual consignments may be exchanged between the DA of the importing and exporting countries concerned.

6 Provisions concerning sizing

Pre-basic TC are exempt from the minimum sizing requirements.

The minimum size of tubers must be such that they do not pass through a square gauge of 25 mm; for varieties having, on average, a length of at least twice the greatest width, the square gauge must not be less than 25 mm. In the case of tubers, which are too large to pass through a square gauge of 35 mm, the difference between the maximum and minimum limits of size should be expressed in multiples of five.

The maximum variation in size between tubers in a lot must be such that the difference between the dimensions of the two square gauges used does not exceed 20 mm unless the buyer and seller agree to deviate from this requirement.

The lot shall conform to the distribution of tuber sizes of the harvested crop within the size specified on the label.

7 Provisions concerning tolerances for sizing

Minimum size tolerances in per cent by weight of tubers	
10%	With a maximum deviation of 5 mm from the minimum size indicated for lots with tubers having a length of at least twice their maximum width
3%	For all other lots
Maximum size tolerances in per cent by weight of tubers	
3%	Larger than the maximum size indicated

8 Provisions concerning presentation

8.1 Condition of containers

Bags must be new; other containers may be reused provided that they are clean.

8.2 Closing of containers

Containers shall be closed officially or under official control in such a manner that they cannot be opened without damaging the official sealing device or without leaving evidence of tampering on the official label provided for in 9.1.

The official system of closing shall comprise either the incorporation into the system of the label mentioned above if it is without a string-hole, or, in all other cases, by the application of an official seal.

Re-closing shall be carried out only by the DA or under its control.

8.3 Nature of contents of containers

Each container shall contain tubers of the same variety, category, class, size and origin.

A lot should be sufficiently homogeneous which means that seed potatoes within different containers are as uniform as is practical and will not vary excessively in composition and appearance.

9 Provisions concerning marking

9.1 Official label

Each container shall bear on the outside an official label in accordance with annex V and which has not been previously used; the label shall be white with a diagonal purple line for pre-basic seed, white for basic seed, and blue for certified seed. Reference to this Standard may be included on the label.

9.2 Official statement

Each container shall have on the inside an official statement of the same colour and showing at least the particulars indicated under E.3, E.5 and E.7. The statement shall be so worded that any confusion with the official label referred to in 9.1 shall be avoided.

This statement is not necessary when an adhesive label or a label of untearable material is used. The particulars given on the label may be indelibly printed on each container in substitution for the official statement provided for above.

9.3 Re-labelling

If a second check appears necessary, the authority, which carried out the second check, must be stated on the label, as well as the date of the re-closing. If a new label is necessary, this must show the particulars, which appeared on the old label, the date of the re-closing, and the authority concerned.

9.4 Supplier's label

Each container may be accompanied by a special label of the supplier.

9.5 Chemical treatment

The nature of the active substance of any chemical treatment of the seed potatoes shall be indicated on the outside of each container, on a tear-resistant or adhesive label being either the official label or a label provided by the supplier, or printed on each container. This information may also appear inside each container.

Annex A
(normative)

Minimum conditions to be satisfied in the production of Pre-basic TC seed potatoes

A.1 The parent material must be true to type for the variety.

A.2 These seed potatoes must be produced from officially certified initial stock, which shall be free from, at least, the following pests:

Potato Spindle Tuber Viroid
Clavibacter michiganensis spp. *sepedonicus* (ring rot)
Ralstonia solanacearum (brown rot)
Pectobacterium spp. and *Dickeya* spp. (syn. *Erwinia* spp.)
Potato viruses X, Y, S, M and A
Potato Leaf Roll Virus

A.3 The facilities and procedures used for this production must be subject to official approval by the DA. Measures must be applied to avoid contamination, e.g. protected environment, double door entry, protective clothing, dedicated footwear or disinfection. The record-keeping system should document the source of the material and the volume of production.

A.4 The growing medium should be pest-free.

A.5 All reasonable husbandry practices for the prevention or spread of pests and diseases must have been effectively carried out.

A.6 The growing crop must have been kept free from *Synchytrum endobioticum* (Schilb) Prc., potato viruses, bacterial diseases and from deviations of variety and type.

The satisfaction of these conditions and the tolerances prescribed for this class in annexes B, C and D shall be established by official inspection and/or testing.

The satisfaction of the conditions under A.2 shall be established by appropriate tests for those pathogens known to occur in the country.

Confirmation of variety purity or trueness-to-type may be dependent on inspection of the crop derived from the seed potatoes.

Annex B
(normative)

Minimum conditions to be satisfied by the crop

B.1 The field shall not be contaminated by *Globodera rostochiensis* (Woll) nor *Globodera pallida* (Stone).

B.2 The proportion of growing plants affected by blackleg shall not exceed:

(a) In crop for the production of Pre-basic category seed, 0 per cent;
(b) In crop for the production of Basic I class seed, 0.5 per cent and of Basic II class seed, 1 per cent;
(c) In crop for the production of Certified I class seed, 1.5 per cent and of Certified II class seed, 2 per cent.

B.3 The proportion of growing plants showing symptoms of virus diseases shall not exceed:

(a) In crop for production of Pre-basic TC class seed, 0 per cent;
(b) In crop for production of Pre-basic class seed, 0.1 per cent;
(c) In crop for production of Basic I class seed, 0.4 per cent, with no more than 0.2 per cent of plants showing severe virus disease;
(d) In crop for production of Basic II class seed, 0.8 per cent, with no more than 0.4 per cent of plants showing severe virus disease;
(e) In crop for production of Certified I class seed, 2 per cent, with no more than 1 per cent of plants showing severe virus disease;
(f) In crop for production of Certified II class seed, 10 per cent virus disease, with no more than 2 per cent of plants showing severe virus disease.

B.4 The proportion of growing plants not true to the variety and plants of another variety should not exceed:

(a) In crop for production of Pre-basic TC class seed, 0 per cent;
(b) In crop for production of Pre-basic class seed, 0.01 per cent;
(c) In crop for production of Basic category seed, 0.25 per cent;
(d) In crop for production of Certified category seed, 0.5 per cent.

B.5 The crop shall be free from:

(a) *Synchytrium endobioticum* (Schilb) Perc.;
(b) *Clavibacter michiganensis Spp. sepedonicus* (Spieck. and Kotth.) Skapt. and Burkh.;
(c) *Ralstonia solanacearum;*
(d) Potato spindle tuber viroid;
(e) Tomato Stolbur.

B.6 Depending on the circumstances and character of potato production in the country, there may be considered:

(a) Requirements for isolation of the crop;
(b) Without prejudice to the requirements of annex IV, the establishment of tolerances for virus diseases and varietal purity.

B.7 The satisfaction of the above-mentioned standards or other conditions shall be established by official inspection and/or testing.

B.8 Depending on the circumstances and character of potato production in the country, a programme of post-harvest testing for virus diseases may be considered.

Annex C
(normative)

Minimum quality conditions for lots of seed potatoes

C.1 Tolerances for defects and diseases allowed for seed potato tubers

C.1.1 Presence of earth and extraneous matter

- Pre-basic TC — 1 per cent by weight
- Pre-basic — 1 per cent by weight
- Basic and Certified — 2 per cent by weight

C.1.2 Dry and wet rot, where not caused by pests listed under section B below

- Pre-basic TC — 0 per cent by weight
- Pre-basic — 0.2 per cent by weight
- Basic and Certified — l per cent by weight

C.1.3 External defects (e.g. misshapen or damaged tubers)

- Pre-basic TC — 3 per cent by weight
- Pre-basic — 3 per cent by weight
- Basic and Certified — 3 per cent by weight

C.1.4 Scab caused by *Streptomyces spp* (common and netted): Tubers affected over a specified per cent of their surface (see annex VIII)

- Pre-basic TC (0% surface cover) — 0 per cent by weight
- All other categories (>33.3% surface cover) — 5 per cent by weight

C.1.5 Powdery scab: Tubers affected over a specified per cent of their surface

- Pre-basic TC (0% surface cover) — 0 per cent by weight
- Pre-basic (> 10% surface cover) — 1 per cent by weight
- Basic and Certified (> 10% surface cover) — 3 per cent by weight

C.1.6 Rhizoctonia: Tubers affected over a specified per cent of their surface

- Pre-basic TC (0% surface cover) — 0 per cent by weight
- Pre-basic (> 1% surface cover) — 1 per cent by weight
- Basic and Certified (> 10% surface cover) — 5 per cent by weight

C.1.7 Shrivelled tubers: Tubers which have become excessively dehydrated and wrinkled.

- Pre-basic TC — 0 per cent by weight
- Pre-basic — 0.5 per cent by weight
- Basic and Certified — 1 per cent by weight

Total tolerance for items C.1.2 to C.1.7:

- Pre-basic TC — 3 per cent by weight
- Pre-basic — 5 per cent by weight
- Basic and Certified — 6 per cent by weight

C.2 The seed potatoes shall be free from *Globodera rostochiensis* (Woll) and *Globodera pallida* (Stone), *Synchytrium endobioticum* (Schilb.) Perc., *Clavibacter michiganensis Spp. sepedonicus* (Spieck. and Kotth.) Skapt. and Burkh., *Ralstonia solanacearum* (E.F. Smith) E.F. Smith, Potato spindle tuber viroid, Tomato Stolbur and *Meloidogyne chitwoodi and fallax* and *Ditylenchus destructor*.

Annex D
(normative)

Minimum conditions to be satisfied by direct progeny of seed potatoes

D.1 Pre-basic seed

(a) The proportion, in direct progeny, of plants of other varieties should be 0 per cent for Pre-basic TC class.

The proportion, in direct progeny, of plants not true to the variety and of other varieties should not exceed 0.01 per cent for Pre-basic class.

(b) The proportion, in direct progeny, of plants showing symptoms of mild or severe virus diseases should not exceed:

- 0 per cent for Pre-Basic TC class
- 0.5 per cent for Pre-Basic class.

D.2 Basic seed

(a) The proportion, in direct progeny, of plants not true to the variety and of other varieties should not exceed 0.25 per cent.

(b) The proportion, in direct progeny, of plants showing symptoms of virus disease should not exceed 2 per cent, with not more than 1 per cent showing severe virus disease, for Basic I class seed, and 4 per cent, with not more than 2 per cent showing severe virus disease, for Basic II class seed.

D.3 Certified seed

(a) The proportion, in direct progeny, of plants not true to the variety and of other varieties should not exceed 0.5 per cent.

(b) The proportion, in direct progeny, of plants showing symptoms of virus disease should not exceed 10 per cent, with not more than 5 per cent showing severe virus, for Certified I class seed and 10 per cent showing severe virus for Certified II class seed. Mild mosaic symptoms of discoloration and no leaf deformation should be ignored in categorizing virus for Certified II class seed.

The tolerances allowed under points D.1(b), D.2(b) and D.3 are applicable only where the virus diseases are caused by viruses already prevalent in countries applying this East African Standard for Seed Potatoes.

The incidence of the virus in the direct progeny may be determined by inspection and/or testing of tubers or plants derived from a sample of tubers from the crop. Annex H describes the principles of developing a sampling regime for this purpose.

Annex E
(normative)

Label

E.1 Particulars

E.1 “East African Standard”, if appropriate

E.2 Nature of the contents: "Seed potatoes"

E.3 The Designated Authority (DA) or its recognized initials

E.4 Country and/or region of production

E.5 Reference number of the lot, including where appropriate the producer's identification number

E.6 Month and year of closing

E.7 Variety

E.8. Category and class and, where appropriate, record of field generation

E.9 Size

E.10 Declared net weight

E.2 Minimum dimensions

110 x 67 mm.

Annex F
(normative)

Guidelines for organizing comparative trials of plots grown from samples collected from lots of seed potatoes (certified according to the Standard)

F.1 Purpose of the comparative trials

The examination of seed potatoes in plots enables the assessment of the conditions specified in annex IV for randomly selected seed lots put on the market.

F.2 Organization

F.2.1 Responsibility for the sampling

The sampling shall be done under the authority of the DA.

F.2.2 Sampling

(a) The lot as defined in Clause 3 is the unit represented by at least one sample.

(b) A sample consists of 110 tubers, taken at random from the lot.

(c) The sample shall be placed in a sealed sack; its label shall bear the information mentioned in Annex E.

F.2.3 Trial fields

(a) Planting should be done in plots of 100 plants. The plots should be grouped by variety so as to facilitate comparison.

(b) Fertilization must be moderate, especially N, to facilitate virus expression.

F.2.4 Visual examination

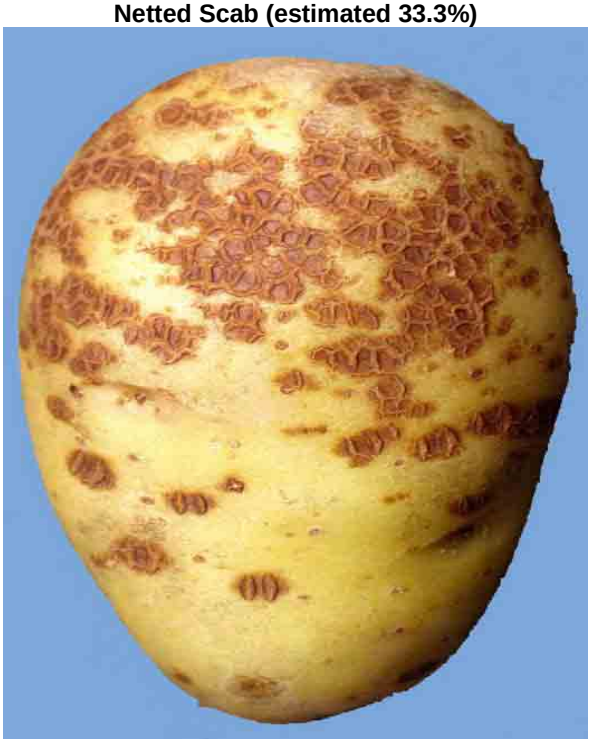
To be accurate, the visual examination shall in general be carried out in two stages, with an interval of 10 – 15 days between them. Laboratory testing may support visual examination. Primary viral infections shall not be taken into consideration.

Annex G
(normative)

Assessment key for percentage tuber surface area coverage

Common Scab (estimated 33.3%)

Netted Scab (estimated 33.3%)



Powdery scab (estimated 10%)

Rhizoctonia

1% surface area coverage

Homogeneous

Concentrated

10% surface area coverage

Homogeneous

Concentrated

Annex H
(normative)

Sampling tubers for virus testing

H.1 Introduction

In testing seed stocks for the incidence of virus, it is seldom feasible to test the entire stock, so a test is done on a sample from the stock. Ideally, only seed stocks with infection levels below the tolerance would be accepted and those above the tolerance rejected. However, taking a sample from a stock means that only an estimation of the actual incidence of virus can be made.

The reliability of this estimation will vary with the size of the sample relative to the size of the lot and the population standard which is set for the test. Defining an acceptable population standard for any sample entails two types of risk.

The first is that of rejecting a stock containing less virus than the tolerance and is often described as the “grower’s” risk. The risk of accepting a stock containing more virus than the tolerance is known as the “buyer’s” risk. From the point of view of classification authorities, this could also be described as the risk of passing a stock which fails to meet the official tolerances.

Such testing makes a number of important assumptions, which are, primarily, that the infected tubers are distributed homogeneously in the stock and that tubers are sampled randomly. In addition, the choice of the size of sample to be tested will need to be balanced by other practical factors, such as cost, available facilities, labour, logistics of handling samples, seed stock size, etc.

The following tables and graphs illustrate some of the principles involved in sampling tubers for testing for virus.

H.2 Confidence limits

Testing different samples from the same seed stock will give a range of results which, statistically, will lie within a specific interval with a certain percentage confidence. This interval is known as the confidence interval.

The acceptable level of confidence or probability should be decided before the testing is conducted but 95 per cent confidence/probability is normally used. The accuracy of the estimation can be improved by increasing the sample size and by adjusting the allowable number of infected tubers in the sample, i.e. the sample tolerance (Table H.1).

For example, the size of the confidence interval for a sample tolerance of 4 per cent (4 allowable tubers) is 8.8 per cent based on a sample of 100 tubers but, on a sample of 200 tubers, the interval decreases to 6 per cent i.e. 7.7-1.7. The effect on the confidence interval of increasing the sample size does, however, become smaller at the larger sample sizes. Increasing the sample size from 100 to 200 tubers improves the accuracy of the estimation by 32 per cent, i.e. confidence interval reduced from 8.8 to 6.0 per cent, whereas increasing the sample size from 300 to 400 tubers only gives an improvement of 15 per cent.

In practice, therefore, the benefits of increasing the sample size have to be weighed up against the additional cost of the testing. The accuracy of the estimation can also be affected by changing the allowable number of infected tubers in the sample (Table H.1). For example, by decreasing the number of allowable tubers from 4 to 3, i.e. changing sample tolerance from 4 to 3 per cent, the confidence interval is decreased from 8.8 to 7.9 per cent and the confidence limits themselves become lower. Decreasing the allowable number of infected tubers in the sample also has a significant effect on the probability of classifying at higher tolerances than those allowed in the sample as illustrated in the next paragraph.

Table H.1 — Confidence limits, at a probability of 95 per cent, for various sample tolerances of virus in relation to the size of the sample

Tolerance for virus in a seed stock (per cent)	Size of sample	Allowable number of infected tubers	Confidence limits	
			Lower	Upper
0.5	100	0	0.00	2.95
	200	0	0.00	1.49
	300	1	0.01	1.84
	400	2	0.06	1.79
2	100	1	0.03	5.45
	200	3	0.31	4.32
	300	5	0.54	3.85
	400	7	0.71	3.57
4	100	4(3)	1.1(0.6)	9.9(8.5)
	200	8(7)	1.7(1.4)	7.7(7.1)
	300	12(11)	2.1(1.8)	6.9(6.5)
	400	16(15)	2.3(2.1)	6.4(6.1)
10	100	10(8)	4.9(3.5)	17.6(15.2)
	200	20(18)	6.2(5.4)	15.0(14.0)
	300	30	6.9	13.8
	400	40	7.2	13.4

H.3 Probability of classifying stocks to meet specified tolerances

From the confidence intervals, it can be seen that classifying stocks based on a sample will contain a risk that some stocks, which fail a test, do in fact meet the tolerance, and others, which pass, should fail. Table H.2 and Figure H.1 show the effect of varying sample size and the number of virus infected tubers allowed in the sample on the probability of classifying seed stocks with different incidences of virus infection. For example, in a test on a sample of 100 tubers where 3 virus infected tubers were allowed, there would be a 14 per cent chance of classifying a stock containing 6 per cent virus as meeting a tolerance of 4 per cent.

Table H.2 — Probability of classifying seed stocks at two tolerances for virus based on a laboratory test in relation to the size of sample and the allowable number of virus-infected tubers in the sample

Tolerance for virus in a seed stock (per cent)	Size of sample	Allowable number of infected tubers	Probability of acceptance or classification						
			infected tubers in stock (per cent)						
			0.5	1	2	4	6	8	10
0.5	100	0	61	37	13	2	0	0	0
	200	0	37	13	2	0	0	0	0
	300	1	56	20	2	0	0	0	0
	400	2	68	24	1	0	0	0	0
2	100	1	91	74	40	9	2	0	0
	200	3	98	86	43	4	0	0	0
	300	5	100	92	44	2	0	0	0
	400	7	100	95	45	1	0	0	0
4	100	3	100	98	86	43	14	4	1
	200	7	100	100	95	45	8	1	0
	300	11	100	100	98	46	5	0	0
	400	15	100	100	99	46	3	0	0
10	100	8	100	100	100	98	85	59	32
	200	18	100	100	100	100	97	75	37
	300	30	100	100	100	100	100	91	55
	400	40	100	100	100	100	100	94	54

NOTE The allowable number of tubers is, often, set at a lower level than the overall seed stock tolerance of 4 per cent and 10 per cent respectively, particularly in the case of a relatively small sample size. By lowering the tolerance in a sample, the buyer's risk is reduced.

Figure H.1 — Probability of classifying seed stocks with different incidences of virus as meeting a tolerance of 0.5, 2, 4 or 10 per cent for virus in a laboratory test in relation to the size of sample and the allowable number of virus-infected tubers in the sample

Figure H.1.a

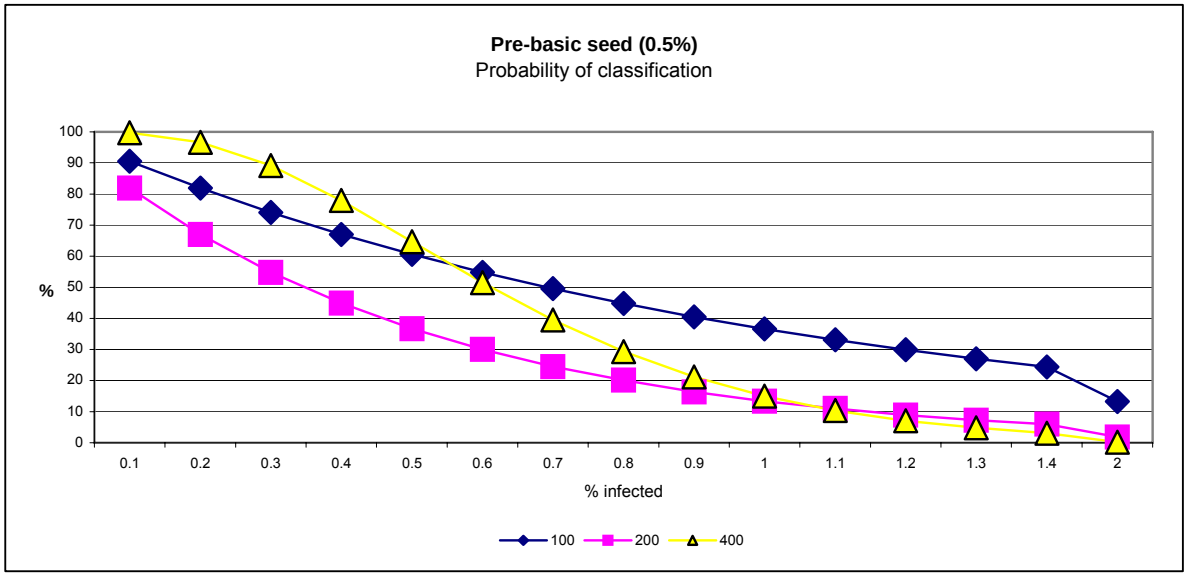


Figure H.1.b

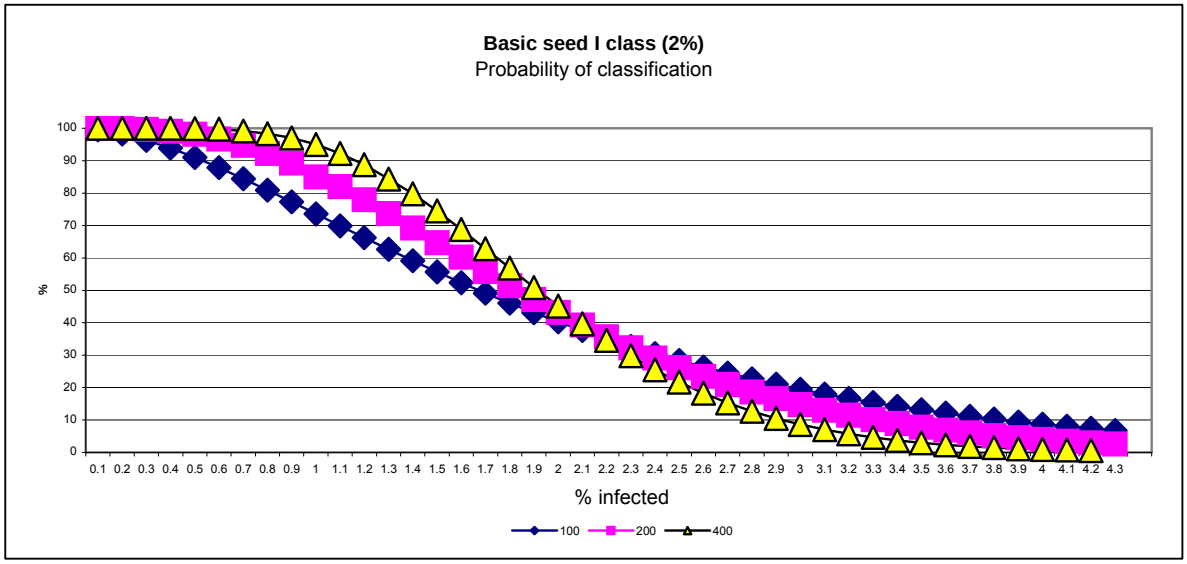


Figure H.1.c

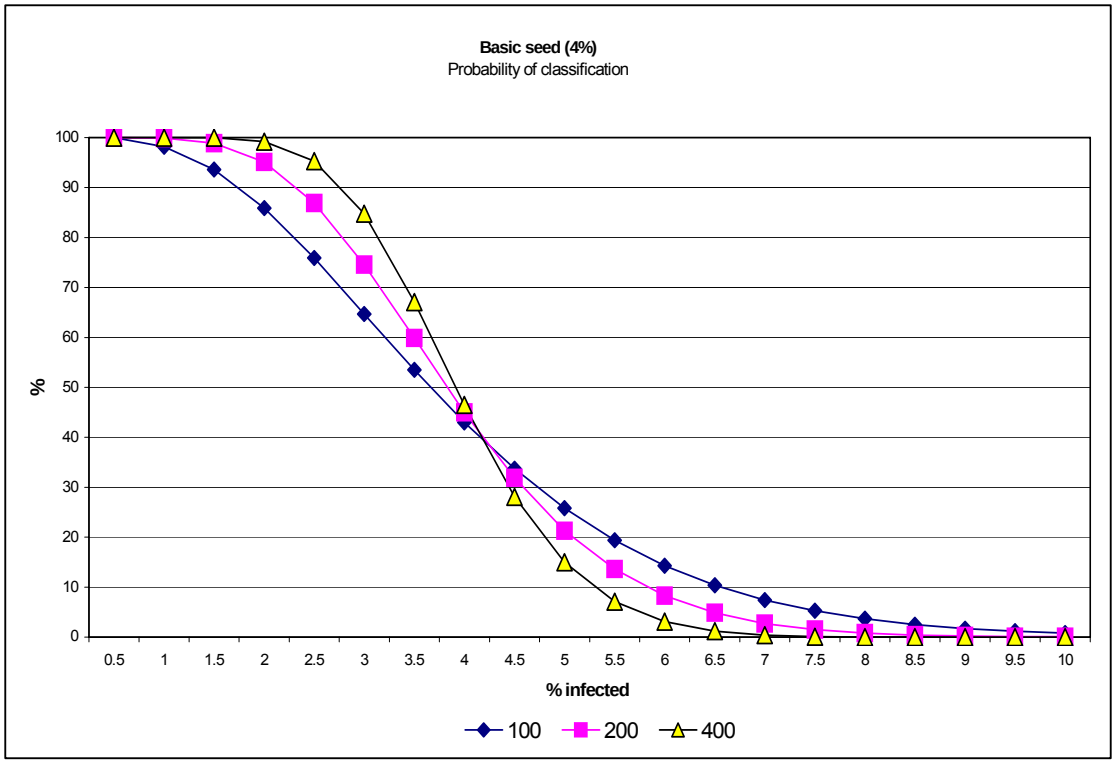
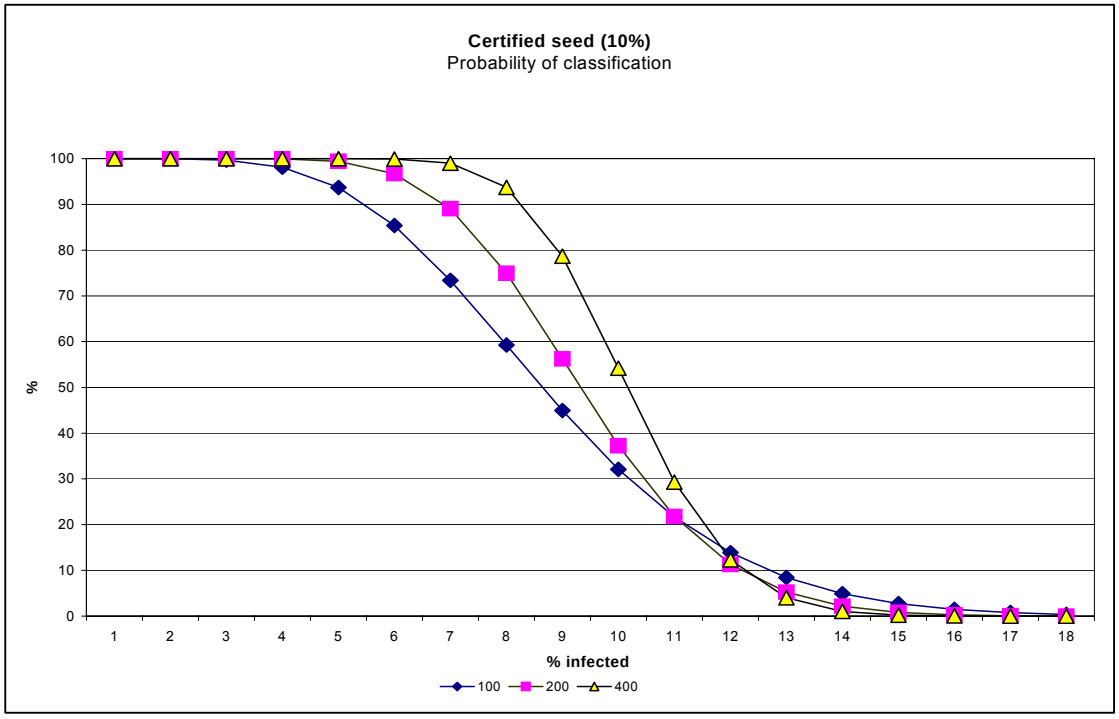


Figure H.1.d



Annex I
(normative)

Summary table of tolerances

	Pre-basic TC	Pre-basic	Basic class I	Basic class II	Certified class I	Certified class II
1. Crop tolerances						
Globodera rostochiensis (soil tolerance)	0	0	0	0	0	0
Globodera pallida (soil tolerance)	0	0	0	0	0	0
Black leg (%)	0	0	0.5	1	1.5	2
Synchytrium endobioticum	0	0	0	0	0	0
Clavibacter michiganensis	0	0	0	0	0	0
Ralstonia solanacearum	0	0	0	0	0	0
Potato spindle tuber viroid	0	0	0	0	0	0
Tomato stolbur	0	0	0	0	0	0
Virus tolerance	0	0.1	0.4 (0.2 severe)	0.8 (0.4 severe)	2 (1 severe)	10 (2 severe)
Other varieties & off types	0	0.01	0.25	0.25	0.5	0.5
2. Lot tolerances						
Earth & extraneous matter (%)	1	1	2	2	2	2
Dry & wet rot (not caused by *Synchytrium e. Clavibacter m. Ralstonia s*.) (%)	0	0.2	1	1	1	1
External defects	3	3	3	3	3	3
Shrivelled tubers	0	0.5	1	1	1	1
Scab (common and netted)	0	5 (33.3)*	5 (33.3) *	5 (33.3) *	5 (33.3) *	5 (33.3) *
Powdery scab	0	1 (10) *	3 (10) *	3 (10) *	3 (10) *	3 (10) *
Rhizoctonia	0	1 (1) *	5 (10) *	5 (10) *	5 (10) *	5 (10) *
Total tolerances (%)	3	5	6	6	6	6
Globodera rostochiensis	0	0	0	0	0	0
Globodera pallida	0	0	0	0	0	0
Synchytrium endobioticum	0	0	0	0	0	0
Clavibacter michiganensis	0	0	0	0	0	0
Potato spindle tuber viroid	0	0	0	0	0	0
Tomato stolbur	0	0	0	0	0	0
Meloidogyne chitwoodi and fallax	0	0	0	0	0	0
Ditylenchus destructor	0	0	0	0	0	0
3. Direct progeny tolerances						
Other varieties and off types	0	0.01	0.25	0.25	0.5	0.5
Virus (%)	0	0.5	2 (1 severe)	4 (2 severe)	10 (5 severe)	10
* The figure in brackets is the allowable % surface area covered: a tuber is deemed to be affected by the disease only if surface area affected exceeds the specified allowable surface tolerance.						

Annex J
(normative)

List of diseases

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
FUNGUS/ CHAMPIGNONS							
Potato wart disease	*Synchytrium endobioticum*	Zero tolerance	Visual observation of tubers and stem base	Tuber: tumours Plant: tumours and galls on stolons and stem base			
Galle verruqueuse ou gale noire	*Synchytrium endobioticum*	Tolérance zéro	Observation visuelle des tubercules et de la base des tiges	Tubercules: tumeurs Plante: tumeurs et galles au niveau des stolons et de la base des tiges			
Late blight	*Phytophthora infestans*	Tolerance for wet or dry rot	Visual observation of plants and tubers	Tuber: rot at harvest and in storage. A reddish-brown granular rot develops under the skin spreading onto the centre of tubers. Plant: necrosis of leaves and stems. Stem lesions of late blight can result in stem cracking.			
Mildiou	*Phytophthora infestans*	Tolérance définie (pourriture humide ou sèche)	Observation visuelle des plantes et des tubercules	Tubercules: pourriture à la récolte et en cours de conservation Plante: nécrose des feuilles, tiges et les bouquets floraux			

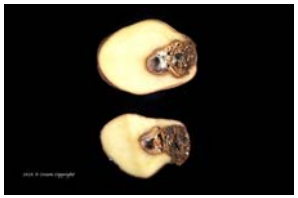
Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
FUNGUS/ CHAMPIGNONS							
Dry rot	*Fusarium solani var. coeruleum*	Tolerance	Visual observation of tubers and identification on specific medium	Tuber: storage rot. Circular rot with concentric wrinkles and white, orange or blue mycelial growth on surface of rot. Light brown rot with a diffuse edge develops from skin inwards. Plant: non-emergence or weak plants	 		
Fusariose	*Fusarium solani* var. *coeruleum*	Tolérance	Observation visuelle des tubercules et identification sur milieu sélectif	Tubercules: pourriture apparaissant en cours de conservation accompagnées de coussinnets mycéliens de couleur claire Plante: non-levée ou manque de vigueur			
Dry rot	*Fusarium sulphureum*	Tolerance	Visual observation of tubers and identification on specific medium	Tuber: storage rot. Small lesions develop at wounds and expand producing symptoms externally similar to gangrene i.e. slightly depressed with a wavy edge. Internally lesions develop cavities filled with grey powdery tissue. Plant: non-emergence or weak plants	 		
Fusariose	*Fusarium sulphureum*	Tolérance	Observation visuelle des tubercules et identification sur milieu sélectif	Tubercules: pourriture apparaissant en cours de conservation accompagnées de coussinnets mycéliens de couleur claire Plante: non-levée ou manque de vigueur			

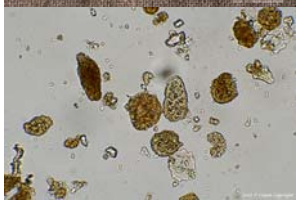
Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Dry rot	*Fusarium avenaceum* and other *F.* spp	Tolerance	Visual observation of tubers and identification on specific medium	Tuber: storage rot. Symptoms tend to be similar to those for *F.solani* var. *coeraleum* although rots are often smaller and affected tissue is dark brown as illustrated for *F.avenaceum* Plant: non-emergence or weak plants			
Fusariose	*Fusarium aven aceum* et autres *F.* spp.	Tolérance	Observation visuelle des tubercules et identification sur milieu sélectif	Tubercules: pourriture apparaissant en cours de conservation. Symptôme similaires à *F.solani* var. *coeraleum* mais les pourritures sont souvent plus petites et le tissue affecté et brun foncé, comme c'est montré pour *F.avenaceum* Plante: non-levée ou manque de vigueur			
Gangrene	*Phoma foveata* and other *Phoma* spp	Tolerance for dry rot	Visual observation of tubers and identification on specific medium	Tuber: storage rot. Initial lesions are round, dark and slightly depressed, often like a thumb mark. As lesions develop they become black and sunken with an irregular wavy edge. Black pycnidia can form on the surface. Rotted tissue is generally brown or black with a well defined margin between healthy and diseased tissue. Cavities are usually lined with purple, yellow or white mycelia. Plant: non-emergence or weak plants	 		May be regulated without tolerance in some regions

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Gangrène	*Phoma foveata* et autres *Phoma* spp	Tolérance définie (pourriture sèche)	Observation visuelle des tubercules et identification sur milieu sélectif	Eubercules: pourriture apparaissant en cours de conservation	 		Dans certaines régions, ce parasite peut être réglementé sans tolérance
Leak (watery wound rot)	*Pythium* spp	Tolerance for wet rot	Visual observation of tubers and identification on specific medium	Tuber: rots develop at wounds soon after harvest when growing conditions are hot. Tubers are discoloured with greasy feel. Rots develop in flesh of tuber with a clear dark line separating healthy outer tissue from spongy, soft brown diseased tissue which turns dark on exposure to air.			
Pink rot	*Phytophthora erythroseptica*	Tolerance for wet rot	Visual observation of tubers and identification on specific medium	Tuber: rots develop at lenticels and eyes soon after harvest when conditions have been wet and warm just before harvest			
Pourriture rose	*Phytophthora erythroseptica*	Tolérance définie (pourriture humide)	Observation visuelle des tubercules et identification sur milieu sélectif	Sur les tubercules: pourriture, apparaissant principalement peu après la récolte			

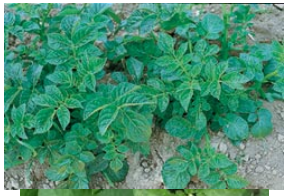
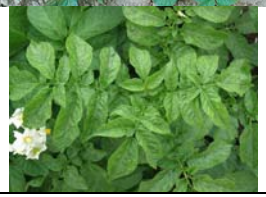
Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
					 		
Rubbery rot	*Goetrichum candidum*	Tolerance for wet rot	Visual observation of tubers and identification on specific medium	Tuber: rot develops at or soon after harvest in tubers from waterlogged soils. Tuber surface is discoloured with patches of white mycelium developing on surface which feels damp. Internally, a grey, watery rot develops rapidly inwards from skin with a sour milk smell.			
Rhizoctonia Black scurf (on tuber)/ Stem canker (on the plant)	Perfect state*: Corticium;* imperfect state: *Rhizoctonia solani*	Tolerance on tubers (black scurf)	Visual observation of plants and tubers	Tuber: blemish caused by dark brown or black sclerotia forming on tuber surface; coverage may be difficult to assess accurately on unwashed dirty tubers. Plant: uneven emergence, wilting and stunting. Stem canker: brown slightly sunken, sharp-edged lesions develop on			Stem canker regulated in some regions. No need for general regulation because regulation of black scurf is seen as more effective

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
				stem bases. A superficial white powdery collar of fungal growth may be seen on stems just above soil level.			
Silver scurf	*Helminthosporium solani*	Controlled indirectly through tolerance for shrivelled tubers	Visual observation of tubers and identification on specific medium	Tuber: skin blemish. Disease starts as small, round, silvery patches on skin. In humid conditions, dark sooty conidiophores can develop around the edge of lesions. Large silvery patches develop as individual lesions expand and merge during storage.	  		Regulated with tolerance in some regions
Gale argentée	*Helminthosporium solani*	Réglementé indirectement en définissant une tolérance pour les tubercules ratatinés	Observation visuelle des tubercules et identification sur milieu sélectif	Tubercules: taches argentées de forme irrégulière sur l'épiderme			Réglementé, avec une tolérance, dans certaines régions
Black dot	*Colletotrichum coccodes*	Controlled indirectly through tolerance for shrivelled tubers	Visual observation of tubers and identification on specific medium	Tuber: skin blemish. Silvery, irregularly shaped lesions present at harvest quickly darken. Lesion is less well defined than silver scurf. Oval, pinhead black bodies (microsclerotia) are often visible on the skin. Growing plant: may contribute to early dying disease in warm climates			Regulated with tolerance in some regions

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Skin spot	*Polyscytalum pustulans*	Not regulated	Visual observation of tubers	Tuber: skin blemish and death of eyes. Small (1-2 mm), brown-black pimples develop on the skin, usually 2-3 months after harvest, eyes may be killed. Plant: uneven and non-emergence			Regulated with tolerances in some regions. No need for a general regulation, not a barrier to trade.
Early blight	*Alternaria solani* and *Alternaria alternata*	Controlled indirectly through tolerances for dry rot	Visual observation of leaves and tubers	Tuber: largely superficial rot Plant: necrosis of leaves			
Alternariose de la pomme de terre	*Alternaria solani* et *Alternaria alternata*	Parasite réglementé indirectement par le biais de la réglementation de la pourriture sèche	Observation visuelle des feuilles et des tubercules	Tubercules: pourriture essentiellement superficielle Plante: Nécroses brunes à noires sur le feuillage, présence d'anneaux concentriques sur les plus grosses taches			
White mould	*Sclerotinia sclerotiorum*	Controlled through tolerance for dry rot	Visual observation of stem	Tuber: rot at heel end, rare. Internal rot is pale brown with fluffy white mycelia and black sclerotia developing in cavities. Plant: wilting and death of individual stems. Pale green to white, water-soaked lesions develop at base of stem, reddish brown zones develop on these lesions accompanied by growth of woolly, white mycelia in humid conditions.		 	Not to be regulated. Infection is from soil inoculum and not from the tuber

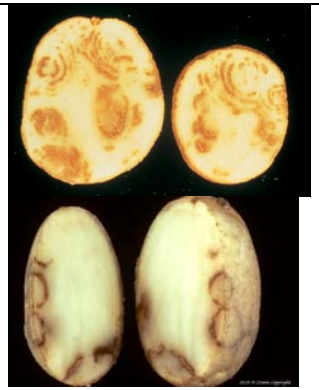
Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Sclerotiniose	*Sclerotinia sclerotiorum*	Parasite réglementé par le biais de la réglementation de la pourriture sèche	Observation visuelle de la tige	Tubercules: pourriture, rare Plante: flétrissement et mort de certaines tiges			Ce parasite ne doit pas être réglementé. L'infection provient du sol et non pas du tubercule
Powdery scab	*Spongospora subterranea*	Tolerance	Visual observation of tubers with confirmation by microscope	Tuber: round individual raised scabs present on tubers at harvest, lesions erupt exposing brown powdery tissue (spore balls) leaving tattered fragments of skin along edge of lesion. Infection at time of eye development can result in outgrowths (cankers) of varying sizes developing at rose end of tubers. Powdery scab spore balls at 250 times magnification	  		May be regulated with tolerance in some regions
Gale poudreuse	*Spongospora subterranea*	Tolérance définie	Observation visuelle des tubercules avec confirmation au microscope	Tubercules: formation de pustules et de chancres			Ce parasite peut être réglementé, avec une tolérance, dans certaines régions
Verticillium wilt	*Verticillium dalhiae* and *V. alboatrum*	Not regulated	Visual observation of leaves and plant	Tuber: vascular discolouration Plant: wilting and death			No need for regulation in the standard because path of infection is primarily though infested soil and not the seed tuber

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
				VIRUS/ VIRUS			
Severe mosaic	Potato viruses Y (all strains), A, V and M, and in combination with PVX and S	Tolerance for severe virus	Visual observation of plant and ELISA test	Plant: distortion or deformation of leaves or plants. This can be rugosity, crinkle, rolling and rigidity of the leaves. Mottling of leaflets may also occur. Tuber: superficial necrosis caused **only** by PVY strains		 	Tuber symptoms regulated with tolerance in some regions

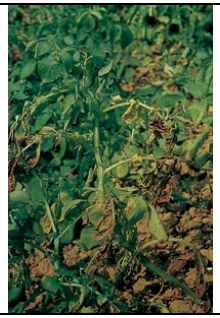
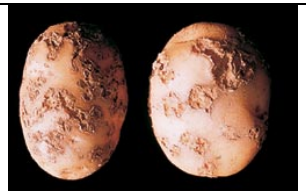
Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Virose grave	Virus de la pomme de terre Y (toutes souches), A, V et M, associés ou non à PVX et S	Virus réglementé avec tolérance définie (virus grave	Observation visuelle de la plante et test ELISA	Plante: présence ou non d'une décoloration des feuilles. Déformation qui peut prendre la forme d'une rugosité, d'une frisolée, d'un enroulement ou d'une rigidité des feuilles ou encore d'un nanisme de la plante Tubercules: nécrose superficielle causée **uniquement** par la souche PVY			Symptômes au niveau des tubercules. Dans certaines régions, ce parasite est réglementé, avec une tolérance
Mild mosaic	PVX, PVS and PVY strains, especially PVY^N	Tolerance for mild mosaic	Visual observation of plant and ELISA test	Plant: discolouration or mottle of leaves without distortion Tuber: superficial necrosis caused **only** by PVY strains		  	Tuber symptoms, regulated with tolerance in some regions

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
							
Virose légère	Souches PVX, PVS et PVY, en particulier PVY^{N}	Tolérance définie (mosaïque légère)	Observation individuelle de la plante et test ELISA	Plante: décoloration ou marbrures des feuilles sans déformation Tubercules: nécrose superficielle causée **uniquement** par la souche PVY			Symptômes au niveau des tubercules. Dans certaines régions, ce parasite est réglementé, avec une tolérance
Leafroll	Potato leafroll virus (PLRV)	Tolerance for severe virus	Visual observation of plant and ELISA test	Plant: rolling of leaves and stunting Tuber: net necrosis in flesh			
Enroulement (Virus E)	Virus de l'enroulement de la pomme de terre (PLRV)	Virus réglementé avec tolérance définie (virus grave)	Observation visuelle de la plante et test ELISA	Sur la plante: enroulement des feuilles et rabougrissement Sur les tubercules: nette nécrose de la chair			
Mop top (Spraing in tubers)	Potato mop-top virus (PMTV)	Not regulated [2]	Visual observation of plant and tubers, ELISA test and PCR	Plant: marked mottling of leaves and stunting of all or some stems. Tuber: necrotic rings or arcs on surface and in flesh			Regulated with a zero tolerance in some regions

[2] According to experience in certain areas, the disease can eradicate itself due to low transmission rates.

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Mop top	Virus PMTV	Virus non réglementé	Observation visuelle de la plante et des tubercules, test ELISA et PCR	Plante: marbrures marquées des feuilles et atrophie de certaines tiges ou de la totalité d'entre elles Tubercules: anneaux ou arcs nécrotiques en surface et pénétrant dans la chair			Dans certaines régions, ce virus est réglementé, avec une tolérance zéro
Tobacco rattle virus (Spraing in tubers)	Tobacco rattle virus	Not regulated [1]	Observation of tubers and PCR	Plant: mottling and distortion of leaves and stunting of some or all stems Tuber: brown, corky arcs and spots in the tuber flesh which are sometimes visible on the skin surface			Regulated in some regions with tolerances
Rattle	Virus du rattle	Virus non réglementé [1]	Observation des tubercules et PCR	Plante: marbrures et déformation des feuilles et atrophie de certaines tiges ou de la totalité d'entre elles Tubercules: arcs et anneaux de décoloration internes, parfois visibles à la surface			Dans certaines régions, ce virus est réglementé, avec des tolérances
Tomato spotted wilt virus	Tomato spotted wilt virus	Not regulated		Plant: leaf spotting and necrosis Tuber: skin blemish and internal necrotic spotting			Regulated in some regions with zero tolerance
			BACTERIA/ BACTÉRIES				
Blackleg	*Pectobacterium*	Tolerance for	Observation of	Plant: yellow, rolled			

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
	atrosepticum (syn. *Erwinia carotovora* subsp. *atroseptica*) and *Pectobacterium carotovorum* (formerly *E. carotovora* subsp. *carotovora*), *Dickeya* spp. (syn. *E. chrysanthemi*)	crop and tuber for wet rot	plant and tuber	upper leaves on blackleg plant; black slimy rots developing on stems. Tuber: watery, soft rot of disintegrating flesh and pungent smell	 		
Jambe noire	*Pectobacterium atrosepticum* (syn. *Erwinia carotovora* subsp. *atroseptica*) et *Pectobacterium carotovorum* (auparavant. *E. carotovora* subsp. *carotovora*), *Dickeya* spp. (syn. *E. chrysanthemi*	Tolérances définies pour la culture et les tubercules (pourriture humide)	Observation de la plante et du tubercule	Plante: pourriture de la tige Tubercules: pourriture molle			
Ring rot	*Clavibacter michiganensis* subsp. *sepedonicus*	Zero tolerance	Observation of plant and tuber, test by IF and PCR	Tuber: vascular soft rot Plant: wilting and death			

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Flétrissement bactérien, pourriture annulaire	*Clavibacter michiganensis* subsp. *sepedonicus*	Tolérance zéro	Observation de la plante et du tubercule, test IF et PCR	Tubercules: pourriture vasculaire molle Plante: flétrissement et mort			
Brown rot	*Ralstonia solanacearum*	Zero tolerance	Observation of plant and tuber, test by IF and PCR	Tuber: vascular soft rot Plant: wilting			
Pourriture brune	*Ralstonia solanacearum*	Tolérance zéro	Observation de la plante et du tubercule, test IF et PCR	Tubercules: pourriture vasculaire molle Plante: flétrissement			
Common scab	*Streptomyces scabiei* and other *S.* strains, e.g. *Streptomyces europaeiscabiei* and *S. stelliscabiei.*	Tolerance on the tuber	Observation of tuber	Tuber: superficial, corky, irregular-shaped scabs on tuber surface; in severe cases, cracks may develop on the affected surfaces			
Gale commune	*Streptomyces scabiei* et autres souches *S.*, par exemple: *Streptomyces europaeiscabiei, S. stelliscabiei*	Tolérance définie en ce qui concerne les tubercules	Observation du tubercule	Tubercules: pustules ou taches			

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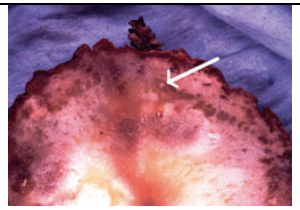
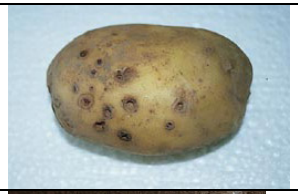
Netted scab	*Streptomyces europaeiscabiei* and *Reticuliscabiei*	Tolerance on the tuber	Observation of tuber	Tuber: superficial netted scabs			
Gale plate	*Streptomyces europaeiscabiei et Reticuliscabiei*	Tolérance définie en ce qui concerne les tubercules	Observation du tubercule	Tubercule: gales plates superficielles			
				VIROID/ VIROÏDE			
Potato spindle tuber viroid	Potato spindle tuber viroid (PSTV)	Zero tolerance	Observation of plant and tuber. Test by molecular hybridization and PCR	Tuber: elongation of tuber Plant: stunting and leaf rolling			
			PHYTOPLASMA/ PHYTOPLASME				
Stolbur	Phytoplasma. [The principal vectors are leafhoppers (*Macrosteles* spp, *Hyalestes* spp)]	Zero tolerance	Visual observation of leaves and tubers	Plant: stunting and leaf rolling			In some regions regulated, zero tolerance
			NEMATODES/ NÉMATODES				
Cyst nematodes	*Globodera rostochiensis* and *Globodera pallida*	Zero tolerance	Visual observation of the field and testing of soil	Plant: wilting and death			
Nématodes à kystes de la pomme de terre	*Globodera rostochiensis* et *Globodera pallida*	Tolérance zéro	Observation visuelle du champ et analyse de la terre	Plante: flétrissement et mort			
Root knot nematodes	*Meloidogyne chitwoodi* and *fallax*	Zero tolerance	Observation of tuber, microscopic examination of cut tuber, and PCR test	Tuber: surface galls and internal necrotic spots			In some regions regulated, zero tolerance
Nématodes à galle des racines	*Meloidogyne chitwood* et *fallax*	Tolérance zéro	Observation du tubercule, examen microscopique de coupes	Tubercules: gales superficielles et taches nécrotiques internes			Est réglementé, avec une tolérance zéro, dans certaines

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
			de tubercule et test PCR				régions
Potato rot nematode	*Ditylenchus destructor*	Zero tolerance	Observation of tuber	Tuber: surface cracking and cortical spotting			In some regions regulated, zero tolerance
Nématodes de la pomme de terre	*Ditylenchus destructor*	Tolérance zéro	Observation du tubercule	Sur les tubercules: craquelures de la surface et taches corticales			Est réglementé, avec une tolérance zéro, dans certaines régions
				PESTS/ RAVAGEURS			
Colorado beetle	*Leptinotarsa decemlineata*	Unregulated	Visual observation of eggs, larvae and adults	Plant: leaf damage			In some regions regulated, zero tolerance
Doryphore	*Leptinotarsa decemlineata*	N'est pas réglementé	Observation visuelle des œufs, des larves et des adultes	Plante: dégâts sur les feuilles			Est réglementé, avec une tolérance zéro, dans certaines régions
Wireworms/ slugs	*Agriotes* sp.*: A obscurus, A. sputator, A. lineatus/ Tandonia budapestensis, Arion hortensis*	Unregulated	Visual observation of tubers	Tuber: tunnels and holes			

Disease	Agent	Status in this Standard	Recommended diagnostic method	General disease description	Tuber symptoms	Plant symptoms	Comment
Taupin	*Agriotes sp.: A. obscurus, A. sputator, A. lineatus/Tandonia budapestensis, Arion hortensis*	N'est pas réglementé	Observation visuelle des tubercules	Tubercules: formation de galeries et de trous			
Tuber moth	*Phthorimea opercullella*	Unregulated	Visual observation of leaves and tubers	Tuber: tunnels in flesh Plant: leaf damage			In some regions regulated, zero tolerance
Teigne	*Phthorimea opercullella*	N'est pas réglementé	Observation visuelle des feuilles et des tubercules	Tubercules: galeries percées dans la chair Plante: dégâts sur les feuilles			Est réglementé, avec une tolérance zéro, dans certaines régions