East African Community

Standard Operating Procedures of Inspecting Maize, Beans and Rice for Pests of Phytosanitary Importance in the East African Community

First Edition Draft

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Preface

The East African Community (EAC) is an economic block that creates demand for trade in a wide range of commodities among the Partner States[1]. In the course of the intra-EAC trade in agricultural commodities, there is a likelihood of introduction of quarantine pests[2], often inadvertently. Therefore, trade in agricultural commodities has to go hand-in-hand with assurances that the commodities in question meet the phytosanitary requirements of importing countries in order to prevent entry, establishment, spread, or impact/consequences of such pests. The risk of movement of pests through trade can be mitigated by applying phytosanitary measures that are commensurate with the level of risk as determined through pest risk analysis (PRA) for each pest under consideration.

The outcomes of phytosanitary inspection of commodities at border points provide the necessary guidance for application of appropriate risk management measures that aim at preventing intra-EAC introduction of quarantine pests. Recognizing the importance of maize, beans and rice in food security and previously reported pest invasions in the region, PRAs were carried out for these commodities. This was based on information from EAC's National Plant Protection Organizations (NPPOs) and reputable global resources. The outcomes of the PRAs have since been adopted by the Sectoral Council on Agriculture and Food Security (SCAFs).

The usefulness of the PRA outcomes is to be realized through operationalization of the proposed risk management measures. It is for this purpose that the EAC embarked on development of harmonized Standard Operating Procedures (SOPs) for use by NPPOs during border clearance of maize, beans and rice commodities transited within the EAC Partner States. The SOPs are to enable plant health inspectors carry out systematic inspection of the three commodities at border points and arrive at conclusions that are regionally acceptable regarding the fate of consignments.

In applying the SOPs, each country should maintain its sovereign right to provide the level of phytosanitary protection that is deemed appropriate without unnecessarily curtailing trade with a contracting party. Indeed, this is the spirit that is expressed through the EAC Protocol on Sanitary and Phytosanitary (SPS) Measures that was adopted by the EAC Partner States on 12th July 2013. Among other objectives, the protocol vouches for a common understanding and application of sanitary and phytosanitary measures and activities within the EAC. Inspection of commodities using agreed standard operating procedures is one such activity that is envisaged in the said EAC Protocol.

[1] *The East African Community (EAC) is constituted by the Republic of Burundi, Republic of Kenya, Republic of Rwanda, Republic of South Sudan, United Republic of Tanzania and Republic of Uganda.*

[2] *The term pest is applied to mean any species, strain or biotype of a plant, animal or pathogenic agent that is injurious to plants or plant products. This may include, and not limited to, insects and other arthropods, bacteria, fungi, nematodes, viruses, parasitic plants and noxious weeds.*

Acknowledgments

The work done by the National Plant Protection Organizations (NPPOs) of the East African Community (EAC) towards the development of the Standard Operating Procedures (SOPs) contained in this document is highly appreciated. This included the Pest Risk Analysis (PRA) that proposed phytosanitary measures for quarantine pests of maize, beans and rice. The NPPOs also provided useful input in the SOPs, including availing information on the approaches and extent of detail for phytosanitary inspections in individual countries and making suggestions on what to include in this document.

The policy support given by the EAC Sectoral Council on Agriculture and Food Security (SCAFs) provided the framework within which the process of developing the SOPs was anchored. The immense logistical support provided by the EAC Secretariat and the Coordinator of the East African Phytosanitary Information Committee (EAPIC) is hereby recognized. This included, but not limited to, ably coordinating the validation of the SOPs by EAC NPPOs and various stakeholders, who are also gladly appreciated.

Among the development partners, USAID/USDA and University of Missouri have been instrumental in facilitating the entire process. This support was invaluable and is highly appreciated.

Revision requirements

A deliberate review of the SOPs in this document will be carried out every 5 years or thereabout five (5) years to capture information on updated pest lists and/or any changes in the status of regulated pests. This will result in progressive editions of the SOPs.

Amendments to the SOPs shall also be made before the 5-year period to capture any relevant information that may become available with respect to phytosanitary regulation framework and/or methods of inspecting consignments for regulated pests in the East Africa Community (EAC). The amendments shall be provided as addenda to the version of the SOP in use while awaiting incorporation during the next review.

All reviews and amendments shall be initiated by the EAC Technical Working Group on Pest Risk Analysis and coordinated by the EAC Secretariat. The National Plant Protection Organizations in the EAC Member States shall be the key technical institutions in the reviews/amendments. Other appropriate stakeholders will also be involved.

Abbreviations and Acronyms

ASEAN	- Association of South East Asian Nations
EAC	- East African Community
EAPIC	- East African Phytosanitary Information Committee
IPPC	- International Plant Protection Convention
ISPM	- International Standards of Phytosanitary Measures
NPPO	- National Plant Protection Organization
NTMs	- Non-Tariff Measures
OEPP/EPPO	- European and Mediterranean Plant Protection Organization
PRA	- Pest Risk Analysis
RNQP	- Regulated Non-Quarantine Pests
SADC	- Southern Africa Development Committee
SCAFS	- Sectoral Council on Agriculture and Food Security
SOPs	- Standard operating procedures
SPS	- Sanitary and Phytosanitary
USA	- United States of America
USAID	- United States Agency for International Development
USDA	- United States Department of Agriculture

Scope

This document contains Standard Operating Procedures (SOPs) of inspecting maize (*Zea mays* L.), beans (*Phaseolus vulgaris* L.) and rice (*Oryza sativa* L.) for quarantine pests that are likely to be spread through dry grain and seed traded within the East Africa Community (EAC). The pests covered are those with an overall medium to high risk of introduction, establishment and spread as determined through the pest risk analysis (PRA) involving the EAC Partner States.

Information on the specific pests, including their occurrence among the countries is provided in the section on Confirmation of Pests in this SOPs document. The listed pests are considered to be of phytosanitary importance and, therefore, necessitate risk mitigation measures as determined through inspection of the three commodities at border points.

In the absence of PRAs that consider the EAC Member States as a PRA area, phytosanitary inspection of the three commodities in trade involving countries outside the EAC should continue following the current inter-state arrangements.

Glossary of Terms

Clearance – Verification of compliance of a consignment with phytosanitary regulations.

Commodity - A plant or plant product being moved for trade or other purposes.

Consignment-A quantity of plants, plant products or other articles being moved from one country to another and covered, when required, by a single phytosanitary certificate (a consignment may be composed of one or more commodities or lots).

Grain beans – Bean seeds (in the botanical sense) for processing or consumption but not for planting.

Grain maize - Maize seeds (in the botanical sense) for processing or consumption but not for planting.

Inspection – Official visual examination of plants, plant products or other regulated articles to determine if pests are present and/or to determine compliance with phytosanitary regulations.

Plant Inspector - A person authorized by a National Plant Protection Organization to discharge its functions.

Laboratory - A room that contains special scientific equipment for experiments or diagnosis.

Lot - A homogenous part of a consignment, which would largely be one variety or a commodity originating from one place. It is considered to be the smallest quantity which can be handled separately (e.g., a compartment or container) if the commodity is presented in bulk (without packaging units such as bags).

Non-regulated pest - A pest that is not a quarantine pest for an area and is, therefore, only governed by the set quality standards/tolerances.

Official control - The active enforcement of mandatory phytosanitary regulations and the application of mandatory phytosanitary procedures to eradicate or contain quarantine pests or to manage regulated non-quarantine pests.

Partially processed rice (Brown rice) – This is partly milled rice in which only the outermost layer of a grain of rice (the husk) has been removed.

Pathway - Any means that allows the entry or spread of a pest; it could be an imported commodity, a means of transportation or storage, packaging, or other articles associated with the commodity and a natural means of spread (e.g. wind).

Pest - Any species, strain or biotype of plant, animal or pathogenic agent, injurious to plants or plant products; an insect, fungus, bacterium, virus, nematode, or invasive plant

Pest Risk Analysis - The process of evaluating biological or other scientific and economic evidence to determine whether an organism is a pest, whether it should be regulated, and the strength of any phytosanitary measures to be taken against it.

Phytosanitary measure – Any legislation, regulation or official procedure to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests.

Quarantine pest – A pest of potential economic importance to the area endangered thereby and not yet present there, or present but not widely distributed and being officially controlled

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

Seed beans - Bean seeds (in the botanical sense) for planting and not for processing or consumption

Seed maize - Maize seeds (in the botanical sense) for planting and not for processing or consumption

Seed rice - Rice seeds (in the botanical sense) intended for planting and not for consumption or processing. Rice grain in which the outermost layer (the husk) has not been removed and is used for propagation.

Standard Operating Procedure - A set of instructions compiled by an organization to help workers carry out routine operations efficiently and with uniform outcomes that enhance compliance with expectations.

Test – Official examination of plants, plant products or other regulated articles, other than visual, to determine if pests are present, identify pests or determine compliance with specific phytosanitary requirements.

Unprocessed or unhusked rice - Rice grains in which the outermost layer (the husk) has not been removed and is for consumption or processing, not for planting.

1. Background

Trade among countries is a necessity since there exists comparative advantages in some countries over the others in terms of potential and efficiency of production of various commodities. For trade to take place, commodities are transited across countries. However, the movement of plants and plant products carries with it the risk of introduction, establishment and spread of quarantine pests or regulated non-quarantine pests (RNQP). Therefore, the necessary sanitary (relating to animals and human food) and phytosanitary (relating to plant health) (SPS) measures have to be taken to mitigate such risks. SPS measures, which are classified as non-tariff measures (NTMs), should be instituted in a scientifically justified, transparent and non-discriminatory manner. For this reason, an agreed way of inspecting commodities, as a basis of applying the necessary phytosanitary measures, is envisaged among the EAC Partner States. This formed the basis of the standard operating procedures (SOPs) contained in this document, which covers maize, beans and rice as key food security commodities that are traded within the EAC region. By using the SOPs, each partner state gives an assurance on the phytosanitary status of the traded commodities to the other contracting parties.

The procedures contained in this document have been developed with full cognizance of the existing and potential capacity for phytosanitary inspection among the EAC Partner States. Focus is mainly on the official entry/landing points for commodities, applicable inspection methods and utilization of regionally harmonized requirements. Particular reference has been made to the guidelines given by the International Plant Protection Convention (IPPC) through applicable standards such as ISPM 23 (Guidelines for inspection), ISPM 31 (Methodologies for sampling of consignments), ISPM 12 (Guidelines for phytosanitary certificates), and ISPM 38 (International movement of seed), among others. At the operational level, the SOP also captures the key approaches to inspection as applied by individual EAC Partner States and the best inspection practices as sourced from other regions, including the European Union (OEPP/EPPO (2016): PM 3/78 (1) Consignment inspection of seed and grain of cereals), USA (USDA (2020): Grain Inspection Handbook – Book 1 Sampling), Southeast Asia (Protocol 8 Sanitary and Phytosanitary Measures to Implement the ASEAN Framework Agreement on the Facilitation of Goods in Transit) and Southern African Development Community (SADC (2014): Sanitary and Phytosanitary (SPS) Annex VIII to the SADC Protocol on Trade), among others.

Effective implementation of these SOPs greatly depends on the experience and capacity of the individual NPPOs of EAC Partner States. It is clearly recognized that the capacities for inspection and application of phytosanitary measures among the EAC Partner States are varied and that trade in maize, beans and rice with countries outside the EAC exists. The SOPs will be instrumental in harmonizing the inspection processes to provide high levels of confidence on phytosanitary status of consignments of the three commodities. The SOPs will also provide a platform for exposing capacity-related gaps that may need to be addressed, albeit outside the scope of this document.

2. Screening Procedure

2.1. Screening of Consignment-associated Documents

An approved plant inspector of the importing country should scrutinize the documents associated with a consignment that is to be inspected. The documents should describe the consignment as containing the target commodity (maize, beans or rice) in the form of grain or seed (or both in case it is a mixed consignment).

The key documents to look out for are:

(i) Phytosanitary certificate
(ii) Plant import permit
(iii) Certificate of treatment applied (e.g. fumigation) – for grain consignments
(iv) Certificate of analysis – for seed consignments

Since seeds for planting of the three commodities generally pose higher risks of introducing and spreading pests than the grain forms for consumption/processing, all the guidelines governing international movement of seeds, and as provided in ISPM 38, should be followed. In particular, phytosanitary inspection should focus on the certificate of analysis issued by exporting country NPPO and additional information in pre-export field inspections.

Each document should be assessed for validity, completeness, accuracy and consistency, taking note of irregularities such as illegibility, conflicting information, expired validity period, unauthorized alterations (erasures, different inks, editing), non-certified copies and unauthorized endorsements/signatures. Such irregularities should be recorded in the Import Inspection Report Form (Appendix 1).

Consignments that are not accompanied by the above documents or are associated with non-conforming documents should not be accepted. Non-conformities to look out for include deficiencies or errors in the required information and unauthentic information. If such deficiencies are identified, further scrutiny should stop and entry of the consignment should be rejected unless the situation is remedied where possible.

In case the documents associated with a consignment are for commodities other than maize, beans or rice, the indicated commodity should just be recorded, and other appropriate inspection procedures followed for agricultural commodities or the consignee should be directed accordingly.

Upon satisfactory presentation of the required and appropriate documents, the next step of confirming the identity and integrity of a consignment should be taken.

2.2. Confirmation of consignment identity and integrity

A plant inspector should carry out a physical examination of the consignment to verify the identity of the commodity and its integrity i.e. if it is in visually acceptable form, with quantities, packaging and labeling as declared in associated documents.

As guided through ISPM 38 (International Movement of Seeds), consignments that are made up of treated or coated seed for planting should also be accompanied by seed samples taken prior to coating or application of any treatment of such consignments in the exporting country. This is to facilitate subsequent examination/testing for any live pests or symptoms of infection by pathogenic pests in the importing country.

The observations made on the consignment should be recorded in the Import Inspection Report Form (Appendix 1).
In the process of verifying the identity and status of the commodity, the inspector should determine the following:

a) the inspection points on the consignment and how to access them
b) the precautions to take for personal safety and prevention of pest escape
c) the sampling tools to apply in the process of inspection
d) the samples to take and how to hold/transfer them for testing.

Note: Application of the SOPs contained herein in determining the integrity of consignments does not prejudice the use of food safety standards that govern trade in the three commodities. In particular, the guidelines given in EAS 900 (Cereals and pulses – Sampling), EAS 901 (Cereals and pulses – Test methods) and EAS 2: 2017 (Maize grains – Specification) are to be followed for quality parameters such as allowable mycotoxin and moisture as spelt out in the Standards.

3. Tools and Equipment for Inspection

Plant inspectors or other authorized agents are required to have access to various tools, equipment and supplies in order to carry out the process of inspection smoothly and efficiently. There are five key categories of tools and equipment required: for aiding visual observations, for accessing packaged commodities, for taking samples and for protection of inspectors and other people. Among others, the items listed in Table 1 are essential.

Table 1. Some tools and equipment required for inspection of grain consignments

Tool category	Name and variants	Notes
Visual aids	1. Hand lens 2. Magnifying glass 3. Light loupe 4. Bench-stand magnifying lens 5. Microscope 6. Binoculars 7. Torch	a) The visual aid tools help in seeing/observing pests that may be difficult to discern with an unaided eye due to their small size. Most of the aids have a magnification of upto 10x but microscopes provide for higher magnification and are largely used in a laboratory setting. b) Some of the tools e.g., light loupe has in-built sources of light that help in localized illumination of a commodity during inspection. c) Binoculars and torches help in seeing parts of commodity that may be inaccessible due to the nature of arrangement of packages or bulk cargo.
Commodity access tools	1. Scissors 2. Knives	a) There are variants and other tools are for opening up of packages or removal of fasteners from such packages to reach a commodity. b) Care should be taken not to damage the packaging extensively. c) Although this is the responsibility of a client, a plant inspector should have such tools for use when needed.
Sampling tools	1. Triers / sampling spears 2. Forceps and probes 3. Small artist's paint brushes 4. Sieves 5. Trays 6. Sample containers (e.g., vials/tubes, paper sleeves, snap-lock plastic bags, tins, jars)	a) Triers are used in drawing samples from deep inside packages such as bags; they are in varying lengths, diameters and designs (e.g., double-sleeved triers that have compartments to facilitate drawing of samples in multiple depths in single actions). A vacuum probe may also be used to collect samples from various points in a container when a commodity is not in bags or boxes, particularly

Tool category	Name and variants	Notes
		where hand-held triers cannot reach. b) Forceps, fine brushes and probes (dissecting needles) are useful in picking small insects from commodities or surfaces putting them in sampling containers (paper bags or vials) c) Sieves, particularly those with pans underneath, and trays help to discern the presence of pests by separating them from grain.
Personal protective equipment	1. Overcoats/overalls 2. Disposable face masks 3. Eye protection goggles 4. Helmets/hard hats 5. Hand gloves 6. Reflector jackets or vests 7. Work boots 8. First-aid kit 9. Gas detectors	a) Inspectors and workers should always ensure their own safety by using the personal protective equipment (PPE) as appropriate. b) Other safety precautions such as availability of health care and fire control facilities should also be considered. c) Gas detectors can be used to alert on potential gas poisoning whilst first-aid kits are for use in an emergency situation
Basic analysis equipment	1. Moisture meters 2. Rapid test ELISA kits 3. Analytical weighing balances 4. Cameras 5. Inspection translucent tables	a) Quick observations to guide decision-making should be made using such basic analysis and evidence-recording equipment. b) Reference of samples to specialized laboratories with trained and experienced diagnosticians may only be done where necessary.

Note: The above list is not exhaustive. In particular, there are some obvious supplies/items that are commonly used in an established plant inspection facility e.g. ethanol, stationery, labels, sample bags/containers and work space materials.
In case of emergency or outbreak of pandemics, World Health Organization (WHO) guidelines should apply to ensure that workers are protected in place during phytosanitary inspections.

4. The Process of Visual Inspection

Visual examination is the practice of detecting pests that are visually identifiable, or whose signs or symptoms are easily distinguishable. Although the process outlined in this section focuses on import inspections, it can also be applied for export inspections relating to quarantine pests or regulated non-quarantine pests.

Note: Import inspection, as a control procedure performed by an importing country can be less rigorous if a consignment is accompanied by a phytosanitary certificate from the exporting contracting country.

In order to have a thorough assessment, visual inspection should be carried out on several points of a consignment. The number of inspection spots should be guided by the size of the consignment, the number of lots in the consignment and the number of sampling points.

Inspection should involve looking for live infestations in addition to looking for signs and symptoms. The inspector should focus on infestation of the commodity in question by target pests that are stated in the EAC PRA documents, and as listed in Section 6.1 and other quality pests that might cause significant damage to the commodity. This may require the unaided eye and the use of magnifying equipment (Table 1).

All the pests and symptoms/signs observed on the consignment should be recorded in the Import Inspection Report Form (Appendix 1).

In case a pest that is not easy to identify is noticed or if symptoms indicating the presence of a pest are seen, appropriate identification/detention of such a pest should be referred to a specialized laboratory or diagnostician. Inspection outcomes showing the presence of any of pests, whether in the PRA-derived lists or not should lead to decisions and actions stipulated in Table 7. This requires appropriate sampling and delivery of the samples for testing (See Section on sampling).

5. The Process of Sampling

Sampling for phytosanitary inspection of consignments or lots is a form of 'discovery sampling' which is done at the same time with visual inspection. This implies that all live pests and/or symptoms of a pest should be recorded appropriately to form part of the inspection report.

The process of sampling makes use of appropriately selected tools and equipment from among the ones listed in Table 1, appropriate sample containers and the necessary preservation/storage methods depending on the nature of the pests of concern.

Satisfactory detection of the presence or signs of pests of concern requires that an adequately representative sample be taken and examined/tested using applicable methods. Representative samples are obtainable by following guidelines that take the level of confidence of results and the desired level of detection of a pest. Depending on the size of each lot under consideration, guidance on the number of primary samples to be taken based on statistical formulae in ISPM 31 and as synthesized by OEPP/EPPO (2016) are shown in Table 2 and Table 3. These guidelines are adopted for the phytosanitary inspection of maize, beans and rice in these SOPs.

Table 2. Minimum sampling intensity for lots packaged in units not exceeding 100kg

Number of units in a lot (e.g., bags)	Minimum number of primary samples*
1–4	3 primary samples from each unit of the lot
5–8	2 primary samples from each unit of the lot
9–15	1 primary sample from each unit of the lot
16–30	15 primary samples taken at random from the entire lot
31–59	20 primary samples taken at random from the entire lot
60–100	30 primary samples taken at random from the entire lot

**Each primary sample should be approximately 500g*

Source: OEPP/EPPO (2016): PM 3/78 (1) Consignment inspection of seed and grain of cereals. OEPP/EPPO Bulletin (2016) 46 (1), 49–57.

Table 3. Minimum sampling intensity for lots in bulk or packaged in units of over 100kg

Lot size (kg)	Minimum number of primary samples*
100–500	At least 5 primary samples
501–3000	One primary sample for each 300 kg but not less than 5
3001–20,000	One primary sample for each 500 kg but not less than 10
More than 20,001	One primary sample for each 700 kg but not less than 40

**Each primary sample should be approximately 500g taken from random points of the bulk lot.*

Source: OEPP/EPPO (2016): PM 3/78 (1) Consignment inspection of seed and grain of cereals. OEPP/EPPO Bulletin (2016) 46 (1), 49–57.

The samples taken on the basis of the guidance given above are considered to be primary samples, which are subsequently combined (mixed) for each lot to get a homogeneous composite sample. The composite sample is then divided into smaller

multiple samples for use in specific testing for various pests; such samples are referred to as working samples.

Mixing and subsequent dividing the samples is done to ensure that the resultant working samples are representative of the grain from which they were taken. This process also avails working samples that are easy to handle, store and use for various examination/testing processes. Once the working samples are obtained, the rest of the composite sample is released to the consignee (importer or handling agent). The minimum sizes of working samples are shown in Table 4.

Table 4. Minimum quantities of maize, beans and rice working samples for examination and/testing for pests of quarantine importance

Commodity	Nature of commodity*	Working sample weight (g)
Maize	Grain	1500
	Seed	2500
Beans	Grain	1500
	Seed	2500
Rice	Grain	300
	Seed	500

**The indicated sample size provides a 95% level of confidence for grain and a 99% level of confidence for seed when the infection/infestation level is 0.1%t.*

Adaptation: from OEPP/EPPO (2016): PM 3/78 (1) Consignment inspection of seed and grain of cereals. OEPP/EPPO Bulletin (2016) 46 (1), 49–57.

Dividing the samples can be done using a riffle sampler or a sample divider or in other appropriate ways such as use of pails/buckets with parallel rims.

6. Confirmation of Pests

6.1. Pests of phytosanitary importance in maize, beans and rice in EAC

Application of the Standard Operating Procedures contained in this document aims to inspect the commodities for the presence or absence of the pests of phytosanitary concern. The target pests are listed in Tables 5, 6 and 7.

The indication of countries in which each pest occurs should guide an inspector and/or a laboratory diagnostician on points of origin from which consignments should be inspected and/or tested with particular keenness.

Noting that some pests could be occurring in various EAC Partner States and might not have been captured in the PRA-derived lists that were used in the development of these SOPs, regular surveillance to update the pest lists is necessary.

Table 5. Pests of phytosanitary importance in maize consignments originating from among East Africa Community Partner States

Pest		Type of pest	Target commodity	Distribution
Scientific name	Common name			
Ahasverus advena (Waltl, 1832)	Foreign grain beetle	Insect	Grain maize & Seed	Uganda
Araecerus fasciculatus (De Geer, 1775) (Coleoptera: Anthribidae)	Cocoa weevil or Coffee bean weevil	Insect	Grain maize	Kenya, Tanzania, Uganda, Burundi
Prostephanus truncatus (Horn) (Coleoptera: Bostrichidae)	Larger grain borer or Greater grain borer	Insect	Seed maize	Kenya, Rwanda, Tanzania, Uganda, Burundi
Sitotroga cerealella Olivier, 1789 (Lepidoptera: Gelechiidae)	Angoumois Grain Moth	Insect	Seed maize	Kenya, Tanzania
Tribolium confusum Jacquelin du Val (Coleoptera: Tenebrionidae)	Confused flour beetle	Insect	Grain maize	Uganda
Alternaria brassicae (Berk.) Sacc., (1880)	Dark spot of crucifers	Fungus	Grain maize	Kenya, Tanzania, Rwanda
Cochliobolus heterostrophus (Drechsler) Drechsler, (1934)	Southern leaf spot	Fungus	Seed maize	Kenya, Tanzania, Uganda
Cochliobolus sativus (S. Ito & Kurib.) Drechsler ex Dastur (1942)	Root and foot rot	Fungus	Grain maize	Kenya, Tanzania, Uganda
Curvularia lunata (Wakker) Boedijn, (1933)	Seedling blight	Fungus	Grain maize	Kenya, Tanzania, Burundi, Uganda
Stenocarpella macrospora (Earle) Sutton	Macrospora leaf stripe / Dry rot of maize	Fungus	Seed maize	Tanzania, Uganda
Cucumber mosaic virus	Cucumber mosaic	Virus	Grain maize	Kenya, Tanzania
Maize Chlorotic Mottle Virus	Maize Chlorotic Mottle	Virus	Grain maize & seed maize	Kenya, Uganda, Tanzania, Rwanda
Maize Dwarf Mosaic Virus	Maize Dwarf Mosaic	Virus	Seed maize	Kenya
Sugarcane Mosaic virus	Sugarcane Mosaic	Virus	Grain maize & Seed maize	Kenya, Uganda, Tanzania
Ditylenchus dipsaci (Kühn) Filipjev	Stem and bulb nematode	Nematode	Seed maize	Kenya

Table 6. Pests of phytosanitary importance in bean consignments originating from among East Africa Community Partner States

Pest		Type of pest	Target commodity*	Distribution
Scientific name	**Common name**			
Callosobruchus analis (Fabricius)	Bean weevil	Insect	Seed bean & grain bean	Kenya, Tanzania
Sclerotinia sclerotiorum (Lib) de Bary	Cottony soft rot	Fungus	Seed bean	Kenya, Tanzania, Burundi, Rwanda
Fusarium oxysporum f.sp. phaseoli J.B. Kendr. & W.C. Snyder	Yellows of beans	Fungus	Seed bean	Kenya, Rwanda
Fusarium solani f.sp. *phaseoli* (Burkholder) W.C. Snyder & N.H. Hans	Fusarium root rot of beans	Fungus	Seed bean	Uganda
Choanephora cucurbitarum (Berk. & Ravenel) Thaxt., (1903)	Choanephora rot	Fungus	Seed bean	Tanzania
Elsinoe phaseoli (Jenk. in Bruner & Jenk.)	Bean scab	Fungus	Seed bean	Kenya
Cucumber Mosaic Virus	Cucumber mosaic	Virus	Seed bean	Kenya, Tanzania
Pseudomonas syringae pv. syringae van Hall 1902	Bacterial brown spot	Bacteria	Seed bean	Kenya, Uganda, Tanzania
Ditylenchus dipsaci (Kühn,) Filip'ev	Stem and bulb nematode	Nematode	Seed bean	Kenya

**It is important to inspect grain bean consignments for all the pests listed in this table since this commodity is commonly used as planting material in many African bean production settings.*

Table 7. Pests of phytosanitary importance in rice consignments originating from among East Africa Community Partner States

Pest		Type of pest	Target commodity	Distribution
Scientific name	**Common name**			
Corcyra cephalonica (Stainton, 1866)	Rice meal moth	Insect	Grain	Tanzania
Rhyzopertha dominica (Fabricius)	Lesser grain borer	Insect	Grain rice	Tanzania, Rwanda, Uganda
Sitotroga cerealella (Olivier)	Angoumois grain moth	Insect	Grain rice	Kenya, Tanzania, Burundi, Uganda, Rwanda
Tribolium confusum Jacquelin du Val	Confused flour beetle	Insect	Grain rice	Uganda
Cochliobolus sativus (S. Ito & Kurib.) Drechsler ex Dastur	Root and foot rot	Fungus	Grain & seed rice	Tanzania, Kenya, Uganda
Magnaporthe grisea (Hebert) Barr	Rice blast disease	Fungus	Grain & seed rice	Uganda, Kenya, Tanzania, Rwanda
Sclerophthora macrospora (Sacc.) Thirum, C.G. Shaw & Naras. 1953	Downy mildew	Fungus	Grain & seed rice	Uganda

Pest		Type of pest	Target commodity	Distribution
Scientific name	Common name			
Pseudomonas fuscovaginae (ex Tanii et al. 1976) Miyajima et al. 1983	Sheath brown rot	Bacteria	Grain & seed rice	Burundi, Tanzania, Rwanda
Pseudomonas syringae pv. syringae van Hall	Bacterial canker or blast (stone and pome fruits)	Bacteria	Grain & seed rice	Kenya, Uganda, Tanzania
Xanthomonas oryzae pv. oryzae (Ishiyama 1922)	Rice leaf blight	Bacteria	Grain & seed rice	Tanzania
Rice yellow mottle virus	Rice yellow mottle	Virus	Grain & seed rice	Kenya, Rwanda, Tanzania, Uganda, Burundi
Aphelenchoides besseyi Christie 1942	Rice leaf nematode	Nematode	Grain & seed rice	Kenya, Tanzania, Burundi, Uganda

6.2. Recognition and identification of pests of phytosanitary concern in EAC

Confirmed identity/detection of a pest makes an important contribution in the decision that is to be made with respect to a consignment that either meets phytosanitary requirements or fails to do so.

Specific recognition or identification of various pests can be achieved at the visual inspection stage or through the application/use of basic analysis equipment/methods that are accessible to a plant health inspector. Many insect pests can be identified easily at this stage. Symptoms such as holes and floury dust on grains can signify damage by insect pests. Since symptoms/signs of damage can be similar for different pests, an inspector should keenly look for presence of the pests, particularly adults and larvae, on the surface of grains, among the grains and inside the grains.

Appendix 2 provides key features and descriptions that are essential guides to recognition and differentiation of the key insect pests of regulatory importance in grain consignments. It is important to note that observation of some of the features may require laboratory processes such as dissection of grains or incubation of samples for pests to emerge before a confirmed identity is given.

If visual inspection reveals the presence of live pests of concern, an outright decision can be made without further processes. In case the pests detected are dead, documentation should be checked to confirm if some form of treatment had been administered or the death could have been caused by adverse conditions such as during storage and/or transportation; again, an appropriate decision should be made.

Thorough examination of samples is carried out to determine the identity of the live pests that could not be ascertained visually during visual inspection. However, there are instances where no pest can be seen and only symptoms are noticed. If such symptoms are considered to be indicative of pest infestation/infection on a consignment, detection protocols should be applied to confirm the presence and

identity of pests. This is particularly so for pathogens (bacteria, fungi, viruses and nematodes), in which case the samples taken in the process of visual inspection are analyzed.

The symptoms may be seen either with the naked eye or, at least, under low magnification. The symptoms may include discoloration, shriveling, cracks and/or growth of an organism on seed/grain surface. For instance, examination of grain/seeds under a stereoscopic microscope allows detection of the presence of overwintering or reproductive structures of fungi.

Samples with indications of pest infestation/infection that requires confirmation by a diagnostician in a specialized laboratory facility should be delivered promptly to such a facility. The symptoms observed should be part of the sample description as it is delivered to a diagnostician for confirmation.

It should be noted that symptoms might be either obscure or easy to confuse for different pathogens. In any case, some pathogens do not cause any symptoms that are visible on grains. Therefore, specific methods should be applied in laboratory testing of samples for particular pathogens.

The conventional methods used for seed assays can also be applied in detection of pathogens in grain samples. These include isolation on selective media, serological analysis and various versions of polymerase chain reaction (PCR) analyses, some of which may involve selective target colony enrichment followed by PCR (BIO-PCR) (https://www.researchgate.net/publication/236218744).

Clearly, diagnostic methods are beyond the scope of phytosanitary inspections but are a necessary support to the inspection processes. Therefore, it is essential that border point inspectors get ready access to diagnosticians in identified referral laboratories for rapid analysis and release of results. Such referral facilities should have the necessary capacity to confirm the identity of particular pests in order to enable appropriate decisions by phytosanitary inspectors.

All inspection outcomes, whether obtained at the visual inspection stage, examination of samples or after further testing in diagnostic laboratories, should be recorded in the Import Inspection Report Form (Appendix 1).

7. Post-Inspection Decisions and Handling of Consignments

The results of an inspection process and any necessary pest diagnostic/identification support should lead to conclusions to guide on the decision to be made on a consignment and the actions to be taken. Envisaged actions include releasing, rejecting, treating, re-exporting or destruction of the consignment. Table 8 provides the guidelines to use in deciding what action to take on the basis of whether or not a particular type of pest is detected/identified.

Table 8. Guidelines to actions to be taken after inspection

Pest found in consignment	Pest has medium to high risk	Conclusion	Action*
No	N/A	No risk	Clear the consignment to allow entry subject to meeting requirements of other regulatory agencies
Yes	No	Non-regulated pest/Quality pest**	Choose from the following actions (ISPM 20): a) Treatment b) Destruction of the consignment c) Reshipment of the consignment
Yes	No certainty	New pest with potential risk***	1. Send interception notification to source country (ISPM 13) 2. Choose from the following actions (ISPM 20): a) Treatment of consignment - if pest is an insect in grain, not to be used as seed for planting b) Destruction of the consignment - if pest is not identifiable or if pest is in seed for planting c) Reshipment of the consignment - if pest is not identifiable or if pest is in seed for planting
Yes	Yes	Risky consignment	1. Deny entry of consignment 2. Send interception notification to source country (ISPM 13) 3. Choose from the following actions (ISPM 20): a) Destruction of the consignment b) Reshipment of the consignment

* The importer/owner of a consignment should bear the economic impacts for the action taken. Some of the actions may also involve holding of a consignment in preparation for the ultimate action. The phytosanitary regulatory agency should ensure that the recommended action is undertaken; this may involve other enforcement agencies operating in the Partner State.

** If a pest identified in a consignment is not of medium to high risk, it should be considered as a quality pest and treatment of the consignment should be given priority before contemplating destruction or re-shipment.

***If a pest found in a consignment is not in the PRA-derived list, proper identification of the pest should be carried out to determine whether it is regulated or not regulated before a decision is made. Diagnostics referral facilities are essential for such a service. In case such a pest cannot be identified within reasonable time, the consignment should be destroyed or re-shipped to the country of origin.

Once a decision is made on a consignment, the process to be followed in releasing, rejecting, treating, re-exporting or destroying of the consignment (as the case may be) is to be clearly stated on the Import Inspection Report Form (Appendix 1). Any precautions to be taken should also be stated. The position, signature and date of the executing officer should be appended on the form.

8. Communication and Custody of Reports

Reports and regulatory recommendations generated at inspection, sampling and confirmatory analysis stages will be synthesized by the inspector in charge of the particular phytosanitary team/facility and communicated to the client (consignee or handling agent), the Revenue Authority and also to the respective NPPO head office. The office title/position of the person authorized to communicate, and the contact details (including email address and phone number) are to be clearly stated.

Both the officer-in-charge of the phytosanitary inspection facility and the head of NPPO are to document and store the reports in an easy-to-retrieve system for any future reference.

To bring out the regional approach to facilitating trade from phytosanitary perspectives, the head of the executing NPPO is expected to notify the NPPO in the country of origin in case pests of quarantine/phytosanitary concern are intercepted. The procedure given in ISPM 13 (Guidelines for notification for non-compliance and emergency action) should be applied.

The entities referred to in this section should each be given a copy of the complete Import Inspection Report for reference and any necessary follow-up actions.

9. Bibliography

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10. Appendices

Appendix 1. Import Inspection Report Template

East African Community

IMPORT INSPECTION REPORT

1. DATE OF INITIATION OF PHYTOSANITARY INSPECTION PROCESS

…… …… ……

Day *Month* *Year*

2. CONTACT DETAILS OF IMPORTER AND CLEARING AGENT

	Importer's details	**Clearing agent's details**
Full Name	……..	……..
Physical address	……..	……..
Phone number	……..	……..
Email address	……..	……..
Other contacts	……..	……..

3. DOCUMENT CHECK OUTCOMES

Type of document	Presented		Document identification mark (e.g. Number)	Document is satisfactory		Unsatisfactory aspects*
	No	Yes		Yes	No	
Phytosanitary certificate						
Plant import permit						
Certificate of treatment applied *(for grain consignments)*						
Certificate of analysis *(for seed consignments)*						
Other relevant document *(specify)* ……						

*Unsatisfactory aspects may include illegibility, incomplete information, conflicting information, expired validity period, unauthorized alterations (erasures, different inks, editing), non-certified copies and unauthorized endorsements/signatures.

4. IDENTITY AND INTEGRITY CHECK OUTCOMES

Name of commodity	Revenue Authority declaration No.	Country of Origin	Declared destination	Quantity declared	Declared immediate use	Consignment visual integrity* (good, fair or poor quality)	Decision based on identity & integrity of consignment

*This is a general overview of the consignment and may involve a consideration of extent of physical and/or pest damage, moisture aspects such as dampness or presence of admixtures as deduced from visual quality assessment.

5. CONSIGNMENT INSPECTION OUTCOMES

Pest Code	Description of live form seen	Description of signs/symptoms seen	Brief description of any examination done	Name of referral testing facility(if necessary)*	Confirmed pest identity		Phytosanitary status of the pest
					Common name	Scientific name	

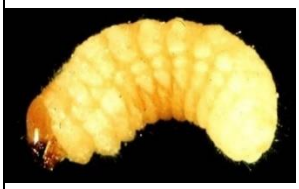
*This applies to situations where further analysis is required in a specialized diagnostics laboratory.

6. PHYTOSANITARY INSPECTOR'S DECLARATION OF INSPECTION DECISION

	Decision made	Further comments (if any)
	……	……

……	……	……
Inspector's name	**Signature**	**Official Stamp with date**

Appendix 2. Guide to recognition/identification of key insect pests of phytosanitary importance in EAC

Scientific name	Common name(s)	Key features	Visual guide
Ahasverus advena (Waltl, 1832) (Coleoptera: Silvanidae)	Foreign grain beetle	The adult beetle is reddish brown or sometimes black and measures approx 2mm long; its diet is entirely fungi. Larvae are worm-like, cream-colored and up to 3mm long.	 https:// www.wikiwand.com  https://upload.wikimedia.org/wikipedia/commons/b/ba/Ahasverus_advena_larva
Araecerus fasciculatus (De Geer, 1775) (Coleoptera: Anthribidae)	Cocoa weevil or Coffee bean weevil	The adult is a dark brown beetle with light brown spots, long antennae and a body length of 1.5-4mm. Larvae are footless and have a slim, curved and hairy body, measuring 5-6mm.	 https://bugguide.net/node/view/  https://www.ozanimals.com/Insect/Coffee-Bean-Weevil/Araecerus/fasciculatus.html
Callosobruchus analis (Fabricius)	Bean weevil	Adults are generally compact and oval in shape, with small heads somewhat bent under. Colors are usually black or brown, often with mottled patterns.	

			http://bugwoodcloud.org/images/192x128/5460509.jpg  http://bugwoodcloud.org/images/192x128/5460514.jpg
Corcyra cephalonica (Stainton, 1866)	Rice meal moth	Adults have hind-wings that are pale-buff, fore-wings mid- or greyish-brown with thin vague lines of darker brown along wing veins. Wing span is 15-25 mm. Larvae are generally creamish-white; head capsule and prothoracic tergite are brown.	 https://lh3.googleusercontent.com/  https://media.springernature.com/original/springer-static/image/
Prostephanus truncatus (Horn) (Coleoptera: Bostrichidae)	Larger grain borer or Greater grain borer	Adult beetles and larvae cause grain damage. Adult beetle is 3-5mm long, cylindrical, reddish brown to dark brown and have the head turned down, appearing to be covered by a hood. Larvae have white, fleshy C-shaped bodies with short legs and a sparse covering of hairs.	 https://cropgenebank.sgrp.cgiar.org/index.php  https://www.semanticscholar.org/author/M. Vázquez-Arista/1403807209

Rhyzopertha dominica (Fabricius)	Lesser grain borer	Adults have a long (2.3-3mm), cylindrical body; dark red-brown/black in colour. Head and abdomen feature rows of tiny indentations; antennae finish with 3 larger segments that form a club.	 https://taxref.mnhn.fr/api/media/download/inpn/206098  https://thumbs.dreamstime.com/z/larva-rhyzopertha-dominica
Sitotroga cerealella Olivier, 1789 (Lepidoptera: Gelechiidae)	Angoumois Grain Moth	Larvae are the destructive stage and are largely hidden inside the grain, where they feed and pupate before exiting as adults to leave small, round holes, mainly on the outermost layers of stored grain if it is closely packed. The adult is a moth with clay-yellow forewings without markings and grey hind wings; the wing expanse is 13-19mm and 6-9mm long.	 http://eagri.org/eagri50/ENTO331/lecture32/003.html  http://www.dicksonchemical.com/insects  https://bugguide.net/node/view

Tribolium confusum Jacquelin du Val (Coleoptera: Tenebrionidae)	Confused flour beetle	The adult is a slim, uniform red-brown to black beetle measuring 3-4mm long and has antennae that gradually broaden towards the tip. The larvae are 5-6mm long, slim, freely mobile and are whitish to yellow-brown in color.	 http://www.dicksonchemical.com/insects  https://www.bugs.com/bug-database/beetles/confused-flour-beetle/