



COLEAD

GOOD PRACTICE GUIDE

BEANS AND PEAS IN PODS



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FOREWORD

Through the process of data collection in collaboration with the industry stakeholders, a set of information that is a true reflection of what is happening in the industry has been collected, analyzed and compared with what should be happening in the industry to develop a self-assessment guide for bean and peas in pods for the sector.

There are many choices that can be made in the handling protocols of beans and peas in pods, as well as numerous steps in the supply chain. The layout of the guide is based on each step in the supply chain, so that operators within that step can easily access suggested protocols.

Against the recent market notifications which could possibly lead to a complete ban of beans and peas in pods from Kenya, the purpose of this guide is to flag and emphasize issues of particular importance to the maintenance of quality through the entire distribution chain, so that operators can include critical aspects in their own detailed operations protocols.

TRACES data extracted on 07/11/2022 indicated that the number of occurrence of harmful organism (s) in commodities imported into the EU or Switzerland inspected during the month of October, 2022 were 104. Out of this, 98 cases were of plant or produce origin while 6 were from pallets and or pallet collars. During the same period Kenya had 9 notifications especially from leafy vegetables.

In order to protect this sector and safeguard Kenya's market share in the international market, a code of practice that is in compliance with standards and regulatory requirements must be put in place.

The main objective is therefore to develop a sectoral Good Practice Guide for **BEANS AND PEAS** in pods value chain, based on the results of the analysis of sanitary and phytosanitary risks and problems related to commercial quality/post-harvest losses carried out on all production operations (entire value chain), and thereafter submitted for validation by stakeholders.

The GPG has been developed by the National Horticulture Taskforce and will be subjected to a review from time to time to make it complaint with changes in the market as they emerge. Much as it has been done with support from COLEAD, the document belongs to the industry and therefore professionals from the sector should disseminate and help in its implementation and also ensure it is updated regularly.





1

INTRODUCTION

The beans and peas in pods value chain represents an important foreign exchange earner and employment generator for Kenya. The country's domestic value of horticulture production in 2019 was Kshs. 268.5 Billion compared to Kshs. 255.6 Billion in 2018 equivalent to an increase of 5.0 per cent. Over the same period, cultivated area increased by 19.2 per cent from 416,185 ha to 495,998 ha while total production increased by 19.2 per cent from 6.53 million tons in 2018 to 7.87 million tons in 2019.

Vegetable production value during the same period increased by 11.5 Billion accounting for 21.2 increase as compared to the same period in 2018 while production and area increased by 37.5 and 10.5 percent respectively. (Source: HCD Horticulture validated Report 2018-2019).

In 2020, the value of horticultural produce exports increased to Kshs 150.16 Billion from Kshs 142.72 Billion in 2019 representing a 5.2% increase. During the same period, the value of vegetables exports decreased by 4.6% from Kshs 25.39 Billion in 2019 to Kshs 24.23 Billion in 2020. (Source: HCD Horticulture validated report 2019-2020).

This marked increase in vegetables exports in 2019 was attributed to compliance with the export market requirements by majority of exporters especially to the European market that includes Kenya's leading vegetable importing countries of Netherlands, United Kingdom, France and Germany.

Despite the efforts being made by some exporters to adhere to internationally accepted best practice, beans and peas in pods from Kenya still continue to receive notifications for non-conformities in the European market. According to KEPHIS, the year 2020 recorded 56 notifications compared with 57 notifications in 2021. September 2020 had the highest notifications at 12 in number while the highest in 2021 was in July where 13 notifications in total were received. The year 2022, up to October received 60 notifications. These high figures and their frequency do not augur well for the Country and might result in serious business repercussions including a total ban of beans and peas in pods from Kenya in these markets. The trace notifications in 2021 came from Netherlands (18), France (16), Belgium (5), United Kingdom (3), and Germany (2). The notifications from February, March, April, July, August, and September 2021 were as a result of **Acephate & Methamidophos**, while in June the notification was due to the presence of **Chlorpyrifos, Cufuthrin, Acephate and Methamidophos**. Detection of banned pesticide molecules or exceeded limits in Kenya green beans has led to decline in exports robbing Kenya a significant market share. The main cause for the notifications as in the previous years was MRLs (80%), while the remaining 20% was due to quarantine/regulated pests as well as wrong documentations.

The major contributor to the decline and looming closure in beans and peas in pods export volume to the European markets is as a result of noncompliance with pesticide residues. Interviews with farmers during data collection indicated that the high MRL values are due to drift from pesticides used during the control of fall army worm on maize plantations.

Be it as it may, the continued noncompliance and resultant interceptions of Kenyan snap beans are attributed to the inadequate capacity for smallholder operators and operator groups to effectively put control measures both at the farms and at the Pack Houses, unstructured stakeholder and institutional coordination, and relaxed enforcement mechanisms.

The compliance with sanitary and phytosanitary regulations of the export market by Kenya's exporters anchored on a Good Practice Guide will form the basis of a self-regulation mechanism that will not only open more lucrative market opportunities for beans and peas on pods but at the same time will also reduce notifications and the number and regularity of inspections of these produce at ports of entry in the international markets.

This Good Practice Guide for beans and peas in pods is therefore a tool that will be used by operators, and all stakeholders within the industry to ensure that operations right from site selection, land and planting operations, pest and disease management, harvesting, storage, transport and packhouse handling are done in compliance and in strict adherence to Good Agricultural Practices.

The aim is to have an industry tool that will reduce exceedance of MRLS, through proper pesticides application and IPM measures guided by recommended PHIs, enhance traceability systems through adoption of Global GAP standards and ensure beans in pods getting into the packhouse do not have chemical residues that otherwise would result into interceptions at the border points of export market destinations. It is envisaged that this Good Practice Guide if adopted by the industry will therefore reduce the number and the cost of Official Inspections done at border points, help in branding the Kenyan produce abroad and eventually open up more market opportunities for beans in pods. At the domestic level, the GPG will also ensure the Kenyan consumers are not exposed to high levels of chemical residues since produce that will not qualify for export market and are diverted to the domestic market for human consumption and animal feed industries will be in compliance with acceptable daily intake per person.

The regulatory and normative framework of Sanitary and Phytosanitary measures obliges all World Trade Organisation (WTO) member countries to comply with the SPS Agreement, which is a right for each of these countries to put in place standards and a control system to protect the health of its populations and to preserve plant and animal health. These regulatory and normative requirements should be based on the risk analysis and taking into account objective and accurate scientific data, and not on disproportionate measures that are not justified. At the level of international trade, the standards, guidelines and recommendations of the Codex Alimentarius (Food and Agriculture Organisation (FAO)/World Health Organisation (WHO), the World Organisation for Animal Health (OIE), and the International Plant Protection Convention (IPPC) are basic references at the regulatory and normative level.

- i. The Sanitary and phytosanitary (SPS) measures are all measures applied to
- ii. To protect human and animal life from risks arising from additives, contaminants, toxins or pathogenic organisms in food products.
- iii. To protect people's health from diseases carried by plants or animals.
- iv. To protect animal or plant life from pests, diseases or disease-causing organisms; or to prevent or limit other damage in a country arising from the entry, establishment or spread of pests.

According to the FAO Guideline, the following basic elements must be contained in any SPS System:

1. Legal framework: laws, decrees, regulations, standards
2. Coordination, control management
3. Control plans and monitoring plans
4. Inspection services
5. Analytical services
6. Crisis management capacity
7. Training of agents and operators
8. Information, training and communication with the public

1.1. IDENTIFICATION OF THE ORIGIN OF THE GUIDE

PRODUCTION OF THE GUIDE	Operators of Fresh Beans and Peas in Kenya
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VERSION NUMBER	Version 1
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APPROVED BY	Steering Committee of the Beans and Peas Good Practice Guide
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This publication is part of a COLEAD collection of training tools, teaching aids and technical documents. All of them are adapted to the different types of beneficiaries and levels of qualification encountered in agricultural production and marketing chains. This collection is available online for COLEAD members. The use of all or part of the publication is possible within the framework of targeted partnerships and according to certain modalities. To do so, please contact COLEAD at network@coleacp.org.

VERSION NO.	DATE OF PUBLICATION	INFORMATION NOTE ON THE REVISION OF THE GUIDE
1	7 th September 2021	Internal experts' working document
2	9 th – 10 th September 2021	Document presented for validation
3	21 st September 2021	Revised Document with input from TWG workshop
4	15 th December 2021	Validated document. First diffusion
5	31 st January 2022	1 st Draft sent to the Steering Committee
6	February 2022	1 st Draft sent to COLEAD
7	13 th May 2022	Revised draft submitted to COLEAD
8	28 th June 2022	Revised draft submitted to COLEAD
9	19 th September 2022	Revised draft submitted to COLEAD
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11	10 th December 2022	Revised draft submitted to COLEAD
12	24 th January 2023	Revised draft submitted to TWG
12	30 th January 2023	Revised draft submitted to COLEAD
13	16 th February 2023	Revised draft submitted to Steering Committee
14	1 st March 2023	Revised draft submitted to Stakeholder Validation





2

PREAMBLE

2.1. INTEREST AND ADVANTAGES OF THE GPG FOR BEANS IN PODS

The Good Practice Guides (GPG) are considered by both the Codex Alimentarius and the European Commission (Regulation on Official Controls (EU) 2017/625 - official controls throughout the food chain Hazard Analysis Critical Control Points) principles and thus to prevent and control SPS risks. The Guide of Good Practices that have been elaborated for the beans and peas in pod sector is based not only on the usual recommendations of Good Hygiene Practices, but also on a systematic analysis approach of the “HACCP” type (analysis of the different stages of production, identification of hazards and evaluation of the level of risk) that has been applied, both to sanitary and phytosanitary risks, within the sector. The purpose of this guide is therefore:

- To facilitate the compliance of practices and products: to help professionals in the beans and peas sector to control the commercial quality and sanitary and phytosanitary safety of products so that they meet the requirements of the destination market (national, regional or export).
- To facilitate the recognition of compliance with standards and regulatory requirements by professionals: to obtain recognition of the capacity of operators in the sector by the local Competent Authorities (C.A.) and those of the destination market, it is a question of:
 - i. demonstrating their capacity to effectively control SPS risks;
 - ii. obtaining a more favourable “risk profile” that can reduce the burden of official control;
 - iii. facilitating sanitary and phytosanitary inspections by communicating their “Integrated Control Plan” indicating the critical control points (CCP) in the processes and the control measures implemented;
 - iv. more easily obtaining certification of their Sanitary and Phytosanitary Quality Management System (SPSQMS) as well as export certification for their products (issuing Phytosanitary Certificates).
- To facilitate dialogue and the exchange of practices in the sector: to establish an open and permanent dialogue between private and public sector stakeholders in order to agree on control methods as well as on the internal controls that will have to be set up within companies, from the plot of land to the shipment of the finished product. The composition of the both the Technical Working Group and the Steering Committee is drawn from industry players from both the public and private sector and thus it is envisaged that they will initiate and manage this dialogue.
- To be a pedagogical tool: the GPG was written to be a pragmatic tool, facilitating the understanding of objectives, content and methods (e.g., HACCP) by professionals. A user manual explains how to implement the GPG recommendations, step by step, in order to be easily understood by those in charge of the beans and pods sector and to be used by company managers, by production or packaging station managers, by quality and traceability managers or by inspectors in charge of official controls in the sector.

2.2. THE GPG WILL HELP THE SECTOR TO

- Draw attention to commercial, sanitary and phytosanitary quality requirements.
- Draw attention to the sanitary and phytosanitary (SPS) hazards significant for the sector (contaminants and regulated pests) based on the nature of the product, production, processing and packaging practices and processes.
- Facilitate the identification of the nature and origin of these hazards, as well as the analysis of these hazards by professionals.
- Declare the general hygienic rules of the Codex Alimentarius into relevant and acceptable recommendations for the sector (contextualisation of PRP).
- Facilitate the determination of CCPs (critical points for the control of sanitary or phytosanitary risks) and the implementation of HACCP plans by the actors in the sector.
- Declare the general phytosanitary measures of the IPPC ISPMs into relevant and appropriate recommendations to ensure access to export markets.
- Facilitate the implementation of integrated measures in a systemic approach to pest risk management (according to ISPM 14) by identifying critical points for concerted action through a combination of several measures.
- Facilitate the implementation of “Integrated SPS Risk Management Plans” and the updating of Good Hygiene Practices, Good Agricultural Practices and Integrated Phytosanitary Measures through the periodic review and updating of the guide.
- Facilitate the implementation of traceability of operations and products.
- Facilitates the implementation of internal (self-) controls.
- Allow for the identification of hazards that are relevant, and the assessment of their level of risk based on production practices and methods.
- Allow the implementation of control measures recognised as effective by professionals in its sector, by adapting them to its needs and resources.
- Allows you to set up internal checks (its self-checking itself), including the samples and analyses to be carried out (nature and frequency: sampling plan to be respected).
- Allows the result of internal audits to be interpreted and to react correctly if non-conformities are detected.
- Facilitate the assessment of the relevance of the proposed systems approach in the commodity chain to meet phytosanitary import requirements.
- Explain the measures to be taken and the procedures to be followed in case of detection of non-compliance (withdrawal, recall, notification, communication).

2.3. INTERESTS AND ADVANTAGES OF THE GOOD PRACTICE GUIDE FOR THE SECTOR

By implementing this Good Practice Guide:

- **You will have applied control measures and internal controls defined by mutual agreement between all the players in the sector.** It will be easier for you to demonstrate the relevance and performance of your internal sanitary and phytosanitary quality control system (SMQS).
- **You will strengthen your business in relation to your customers**
- **You are responsible for the commercial, sanitary and phytosanitary quality of your products:** implementing the GPG recommendations is one of the ways for you to prove and measure the quality of your work (or to detect any weaknesses or failures in your processes). By regularly supplying products that comply with customer requirements and standards, you will feel reassured and encouraged to better control your processes.
- **You will have better control of the production process:** Thanks to the **detection of non-conformities** and failures as early as possible in your production process, you will benefit from positive financial spin-offs thanks to the savings induced by early detection (well upstream of the packaging). The early detection of non-conformities through systematic monitoring of production operations will improve your compliance with regulatory and commercial specifications. You will have an alternative or a complement to your private certifications, e.g. GLOBALG.A.P., BRCGS Global Food Safety Standard LEAF Marque, KS1758 and Albert Heijn protocol for residue control or any other certification, while guaranteeing a level of commercial, sanitary and phytosanitary quality that is at least equivalent.
- **You will reduce the number and cost of internal control:** Better **targeting of controls**, thanks to the knowledge of critical points, allows you to reduce the number of **controls** and the number of samples taken for analysis (especially the most expensive ones, such as microbiological analyses or pesticide residue analyses).
- Implementation of the GPG may eventually provide basis for reduction of the **frequency of official controls of your establishments and products:** By **demonstrating that you have a good understanding and control of the risks**, the Competent Authority may be inclined to reduce the frequency of its inspections and the number of samples to be taken annually in the sector.

2.4. IMPLEMENTATION OF THE GOOD PRACTICE GUIDE FOR THE SECTOR

The implementation of the recommendations (self-monitoring, control measures) included in the GPG depends first and foremost on the interest and willingness of operators in the sector to respect the principles, but also on the feasibility of applying the measures recommended in the Guide. The **control measures** recommended in this Guide, which are based on a risk analysis based on the usual practices observed in the sector, are as a result input from industry players drawn from both the public and private sector who were involved in the development of the guide. The guide was presented to stakeholder representatives for scrutiny and consensus and feedback adapted and included in the guide.

2.5. WHO IS THIS GUIDE FOR?

The following categories of stakeholders are expected to be the main users of this Guide.

OPERATORS

Operators responsible for primary production, processing, distribution and export activities for beans and peas must implement and manage these activities in such a way as to prevent or eliminate hazards that might compromise the safety of food products or reduce to acceptable levels. They are therefore the front-line users of this Guide. Operators must be able to provide all materials (e.g., records, control and analysis results), both to the operator at the next step (e.g., the importer) and supervising authorities, to **document the compliance of their products at each step of their process**.

For this reason, the **company must decide on a strategy and implement “a quality approach”** and ensure that they **always** meet all requirements for food product quality. Achieving this goal **means, first of all**, that the company must set up a “**Food Safety Management System**” (FSMS), whose extent and **complexity** will depend on:

- The target markets (e.g.: the regulatory requirements of the destination markets and the nature of the customer’s in-house standards)
- The size and complexity of the supply chain (including the type of links the company has with small operators)
- The nature and type of product exported
- The number and types of risks identified for the product
 - All Professionals Active in the Sector
 - Agents of Competent Authorities
 - Suppliers/Dealers of Farm inputs and Beans
 - Consultants in the Sector
 - External Partners

2.6. COMPOSITION OF THE WORKING GROUP AND METHODOLOGY FOLLOWED

2.6.1. WORKING GROUP

The design and drafting of this Guide was carried out by a Technical Working Group followed by a Steering Committee, with the collaboration of operators/exporters technical managers/assistants, industry experts, delegates from the production areas, and with the support of scientific and technical expertise from COLEAD.

Table 1 — Composition of the Steering Committee

NAME	ORGANIZATION	FUNCTION	MANDATE IN THE STEERING COMMITTEE
Mr. Benjamin Tito	Horticultural Crops Directorate	Director	Chair Person
Mr. Hosea Machuki	Fresh Produce Exporters Association of Kenya	Chief Executive Officer	Vice-President
Mr. Okisegere Ojepat	Fresh Produce Consortium, Kenya	Chief Executive Officer	Member
Dr. Esther Kimani	Pest Control Products Board	Chief Executive Officer	Member
Dr. Lusike Wasilwa	Kenya Agricultural Research and Livestock Organisation	Director Crop Research	Member
Ms Debora Shituvi	Kenya Plant Health Inspectorate Service	Inspector	Secretary
Mr. Ernest Muthomi	Avocado Society of Kenya	Chief Executive Officer	Co – Chair Person
Dr. Kimaru Stanley	Kenyatta University	Representing academia	Co - Secretary
Mr. Amos Ndalutt	Ministry of Agriculture, Livestock, Fisheries and Crops	Representing Competent Authority	Member
Mr. Richard Ndungu	Kenya National Chamber of Commerce and Industry	BMO Representative	Member
Mr. Philip Mutooni	Avocado Exporters Association	Chief Executive Officer	Member

Table 2 — Composition of the Technical Working Group

NAME	ORGANIZATION	FUNCTION	MANDATE IN THE WORKING GROUP
Ngenga Patrice	FPEAK	Coordinating TWG activities & BMO Representative	Chairman
Gideon Aliero	FPC	BMO Representative	Members
Ms Sarah Ndegwa	HCD	Representing Competent Authority	Member
Mr Anthony Nyaga	KALRO	Representing Competent Authority	Member
Josiah M. Syanda	KEPHIS	Representing Competent Authority	Member
Florence Wambeti	PCPB	Representing Competent Authority	Member
Joseph Mwanga	Kandia Fresh	Representing Operators	Member
Susan Mugure	COLEAD	COLEAD expert	Consultant
Tom Owuor	COLEAD	COLEAD expert	Consultant

Table 3 — Mobilised external expertise

NAME	ORGANIZATION	SPECIAL SKILLS	ACTIVITIES CARRIED OUT
Dr. Washington Otieno	CABI	Sanitary and Phytosanitary	Expert advice on Risk Analysis
Dr. Erick Ogumo	University of Nairobi	Production and Market Standards	Risk profiling for beans and peas production

2.6.2. WORKING METHODOLOGY FOLLOWED

The drafting of this Guide has been carried out according to the recommendations of COLEAD's "Manual for the drafting of Good Practice Guides", by implementing the actions planned in the 4 stages:

Step 1: Organisation and launch of the project

- Setting up the Steering Committee
- Creation of a "Working Group" and appointment of the Project Manager
- Organisation of a Launch Workshop

Step 2: Field surveys (in companies in the sector and/or the main production areas) and inventory of relevant SPS regulations and standards for the sector

- Carrying out a field survey of the sector
- Inventory of analytical and diagnostic laboratory capacities
- Inventory of national and regional SPS legislation and applicable standards
- Drafting of a summary submitted to the Steering Committee

Step 3: Draw up a draft Good Practices Guide, after analysing the hazards and identifying the control measures to be recommended.

- Analysis of practices with the 5M method and proposal of general hygiene recommendations (or PRP, Programme Requirements Prerequisites)
- Assessing the level of risk and identifying IPs (points of attention) and CCPs on the process
- Proposal of control measures to be implemented in the sector
- Proposal of the checks to be set up in the sector
- Drafting of a complete draft Good Practice Guide

Step 4: Finalise and disseminate the Good Practice Guide

- Finalization of the Good Practice Guide
- Organization of a workshop to validate the guide
- Preparation of an "action plan".

2.7. RESOURCES AND SKILLS MOBILISED FOR THE DRAFTING OF THE GUIDE

The resources and skills mobilised for the drafting of the guide consisted of:

1. Consultation of stakeholders in the sector in the different production basins.

On the basis of semi-structured questionnaires, elaborated from the diagrams of the production process, the meetings of the different stakeholders made it possible:

- To collect technical information on the implementation of their activities, in order to determine:
 - b. the operations carried out at this stage of the process;
 - c. the practices and conditions under which they take place;
 - d. the potential risks associated with each stage of production;
- To update and validate the flow chart on the entire value chain, detailing all the stages of production, from the nursery to the final marketing of all the products made by these actors.

2. Documentary review

A set of reference documents was consulted and the literature review supplemented by internet searches in order to gather relevant agronomic information, regulations and standards related to sanitary and phytosanitary risks, as well as trade standards applicable to the sector both at national and international level. Bibliographical references and URL indications (addresses of websites consulted) are given in Part C of the Guide.

3. Mobilisation of scientific and technical expertise for the drafting of the guide

The drafting of this Guide required the contribution of local and external expertise, composed of two national consultants with complementary profiles and a good knowledge of the beans and peas sector and an external expert in charge of the scientific validation of the risk assessment and the general revision of the Guide's drafting.

2.8. HOW TO USE AND DISTRIBUTE THE GUIDE

This Guide provides professionals, operators, processors and distributors in the sector of fresh beans and peas with the means and methods to control the sanitary, phytosanitary and commercial quality of products, from the field production stage to dispatch. Compliance with the requirements and practices proposed in this Guide ensures that all operators in the chain that the operations carried out and the hygiene measures implemented in each production unit are suitable for ensuring the safe consumption of the products and that they are subject to constant and appropriate monitoring.

THE GOOD PRACTICE GUIDE IS VOLUNTARY

Each operator in the sector can take inspiration from the “practical sheets” and “check lists” proposed, but it is advisable to adapt them to his situation. On the basis of an **analysis of the different stages of the production process**, an assessment of the SPS risks in the value chain and traceability requirements, the Good Practice Guide informs operators, internal or external inspectors/auditors about:

1. What you **need to know**: At this level, the **main hazards** that may arise during operations and result in a risk of non-compliance with applicable regulatory or commercial requirements must be identified and then addressed by appropriate control measures and controls. Hazards may be of a (micro) biological (including pests), chemical or physical nature or result from the non-control of a process which may have an impact on commercial quality criteria (taste, colouring, etc.).
2. What **needs to be done**: these are the **preventive or control measures whose implementation is recommended and which have been identified as relevant and effective by a hazard analysis** (using the HACCP approach). Each operator is free to adapt the hazard control recommendations and provisions of the Guide according to his needs and means, but the control measures proposed for the sector in this Guide aim to guarantee operators the sanitary and phytosanitary safety of their products.

Depending on the **level of risk**, i.e. the probability of the hazard appearing and the severity of its impact, a **rating for the prevention or control measure** is defined in the “control plan”. According to the rating system adopted in the Guide, **the requirements are divided into 3 levels according to the estimated risk**:

MAJOR REQUIREMENTS

They relate to preventive or control measures whose failure to implement may lead to non-compliance with a high probability of non-compliance, the impact of which may be serious on the commercial quality of the product or the health of the consumer. For example, contamination with pesticides, heavy metals and microbes (human pathogens). The absence or break in the traceability of batches, from production to export, is also a major requirement.

MINOR REQUIREMENTS

They relate to preventive or control measures whose non-implementation may lead to non-conformity, whose impact is real on the commercial quality of the product or on the sanitary quality but without causing serious and/or irreversible harmful effects (e.g. lack of training of personnel and its repercussions on the conservation of the product).

RECOMMENDATIONS

They relate to control measures whose non-implementation does not have a significant detrimental impact on the sanitary, phytosanitary or commercial quality of the product.

3. What to **record**: the main data to be recorded

Traceability is a regulatory requirement for all food products exported to the EU. Traceability must make it possible to trace a batch of products and to isolate it if necessary (e.g. detection of non-conformity). Compliance with traceability requirements is one of the objectives of this Good Practice Guide. All data or information that must be recorded or documented are defined in this Guide.

4. Useful **appendices**: examples of “Practical Sheets” (procedures), models of “self-checklists” that can be used to implement the self-checking system; as well as documentation, models of teaching aids, etc.

5. **The educational tools to be used**: to raise awareness among the players in the sector about the Good Practices to be implemented in Kenya.

2.9. DISSEMINATION (MANAGEMENT, UPDATING AND CONDITIONS OF ACCESS TO THE GUIDE)

Distribution of the Guide is restricted to operators in the beans in pods sector. Access to the Guide may be subject to a charge. It must be ordered from the following address:

Director Horticultural Crops Directorate

P.O. Box 42601 - 00100

Telephone: 020-2088469

Email: directorhcd@afa.go.ke

Website: www.afa.go.ke

This Good Practice Guide is regularly updated. The version number and the date of entry into force are mentioned at the beginning of the Guide.

2.10. TERMS AND DEFINITIONS

ACTIVE SUBSTANCES

substances or micro-organisms, including viruses, having a general or specific action on harmful organisms or on plants, parts of plants or plant products.

ALTERNATIVE TO PESTICIDES

any method or judicious combination of methods of plant protection that allows a reduction in the use of pesticides and rational management of populations of bio-aggressors and beneficial organisms.

BIOCIDE

literally “which kills living organisms”; any preparation containing one or more active substances which is intended to destroy, repel or render harmless harmful organisms, to prevent their action or to combat them in any other way, by chemical or biological action.

BIODIVERSITY

Biodiversity, in the etymological sense of the term, evokes the diversity of living things, i.e. all the processes, lifestyles or functions that lead to maintaining an organism in a state of life. The term refers to the diversity of the living world at all levels: diversity of environments (ecosystems), diversity of species, and genetic diversity within a single species.

BIOLOGICAL CONTROL

prevention and control method based on the use of natural mechanisms (e.g., natural antagonisms between living beings; predation; parasitism; etc.). It is a technique whereby a biological control agent (mite, insect, fungus, bacterium, virus, nematode, etc.), which may be an exotic species, is introduced into an environment in order to control a specific harmful organism under given conditions.

BIOPESTICIDE

a plant protection product of biological origin that can be a living organism or a substance of natural origin. Within plant protection products, biopesticides are a sub-group of products derived from natural materials (e.g. products based on plant extracts; products containing a micro-organism; or pheromones, chemical substances emitted by plants and animals that modify the behaviour of other individuals within the same species).

CONTAMINANT

any substance not intentionally added to food, which is present in such food because of the production (including operations carried out in crop husbandry, animal husbandry and veterinary medicine), manufacture, processing, preparation, treatment, packing, packaging, transport or holding of such food or as a result of environmental contamination. The term does not include insect fragments, rodent hairs and other extraneous matter.

CHEMICAL CONTROL

a prevention and control technique in which an active substance is applied systematically (according to a treatment schedule, for prevention) or in a reasoned manner (according to an alert system that shows the level of damage and advises treatment to limit economic losses) to destroy a pest.

COMMERCIAL QUALITY

a quality product is one whose characteristics enable it to satisfy the needs (expressed or implicit) of customers (AFNOR definition). Commercial quality is achieved when the product meets the expected specifications.

COMPETENT AUTHORITY

The Competent Authority is in any agency, authority, government body, department, inspection, minister, ministerial official, parliament or public or statutory person (autonomous or not) having jurisdiction over any of the activities envisaged by national legislation or international agreements (e.g., SPS Agreement). The Competent Authority is responsible for the enforcement of legislation in the SPS (sanitary and phytosanitary) field, including the organization of inspections and controls in the food chain.

COMPLIANCE PROCEDURE (FOR A CONSIGNMENT)

Official procedure used to verify that a **consignment** complies with **phytosanitary import requirements** or **phytosanitary measures** related to **transit** [CEPM, 1999; revised CPM, 2009].

CONFORMITY VERIFICATION PROCEDURE (FOR A CONSIGNMENT)

official method used to verify the compliance of a consignment with the phytosanitary import requirements or phytosanitary measures relating to transit.

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**) [FAO, 1990; revised ICPM, 2001].

CONTAINER (CONTAINER, PACKAGING)

any object (e.g., cardboard box, bottle etc) used to contain and preserve a certain volume or quantity of product (e.g., pesticide).

CONTAINMENT

Application of **phytosanitary measures** in and around an infested **area** to prevent **spread** of a **pest** [FAO, 1995].

CONTAMINATION (PHYTOSANITARY ASPECT)

presence of a contaminating harmful organism or unintentional presence of a regulated article inside or on the surface of a good, packaging, means of transport, container or storage place.

CONTAMINATION (HEALTH ASPECT)

unintentional presence of a pathogenic microorganism (for humans or animals) or a contaminant of a chemical nature (e.g., heavy metals, residues, mycotoxins, etc.), inside or on the surface of a good.

CONTAMINATION PEST

A **pest** that is carried by a **commodity, packaging, conveyance** or container, or present in a storage place and that, in the case of **plants** and **plant products**, does not infest them [CEPM, 1996; revised CEPM, 1999; CPM, 2018].

CONTAMINATING HARMFUL ORGANISM

a harmful organism carried by a commodity, packaging, means of transport or container or present in a storage place, but which, in the case of plants and plant products, does not infest them.

CONTROL

evaluation of conformity (pre-established requirements or characteristics to be met by a raw material, process or finished product) by observation and judgement accompanied, if necessary, by measurement, testing or calibration. Official controls” include documentary checks, identity checks, inspections (physical checks of products, establishments, sites, transport, etc.), visual checks, sampling for phytosanitary diagnosis or contaminant analysis (microbiological analyses or instrumental analyses for traceability).

CONTROL PLAN

control programme that allows the targeted search for anomalies, non-conformities and even fraud.

DISPOSAL

any operation consisting of recycling, neutralizing, destroying or isolating pesticide waste, used containers and contaminated materials.

DISTRIBUTION

Operation by which goods (agricultural products, inputs) are sold through commercial channels on domestic or international markets.

ENTRY (OF A PEST)

Movement of a **pest** into an **area** where it is not yet present, or present but not widely distributed and being **officially controlled** [ISPM 2, 1995].

ENVIRONMENT

the surrounding environment, including water, air, soil and their relationships, as well as all the relationships of these elements with living organisms.

EQUIVALENCE (OF PHYTOSANITARY MEASURES)

Organization Agreement on the Application of Sanitary and Phytosanitary Measures (WTO, 1994); ISPM 24, 2005].

TRACES

notification and early warning system for phytosanitary interceptions. It is a system established for the Member States of the European Union and Switzerland dealing with interceptions for phytosanitary reasons of consignments of plants and plant products imported into the EU or traded within the EU. TRACES is managed by the Directorate-General for Health and Food Safety of the European Commission.

EXTENSION SERVICE

services in a given country responsible for providing operators with information and technical advice on practices to improve the production, handling, storage and marketing of agricultural products, training and the transfer of appropriate technologies.

EXTREMELY HAZARDOUS PESTICIDES

pesticides that are known to present particularly high levels of acute or chronic risks to health or the environment, according to internationally recognized classification systems such as the WHO classification or the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), or indicated as such under applicable binding international conventions or agreements.

FOOD SAFETY

Food safety is used as a scientific method/discipline describing handling, preparation, and storage of food in ways that prevent food-borne illness. The occurrence of two or more cases of a similar illness resulting from the ingestion of a common food is known as a food-borne disease outbreak.

FORMULATED PRODUCT (FORMULATION)

Commercial preparation (mixture of active substances and co-formulants such as solvents, emulsifiers, dyes, thickeners, etc.) presented in a “form” (solid or liquid) in which it is packaged and sold.

GOOD AGRICULTURAL PRACTICE (GAP)

are a set of principles, regulations and technical recommendations applicable to production, processing and food transport, addressing human health care, environment protection and improvement of worker conditions and their families.

HAZARD ANALYSIS CRITICAL CONTROL POINT (HACCP)

HACCP: a tool to assess hazards and establish control systems that focus on prevention rather than relying mainly on end-product testing.

HACCP system - science based and systematic method that identifies specific hazards and measures for their control to ensure the safety of food.

HARMFUL ORGANISM

any species, strain or biotype of plant, animal or pathogenic agent harmful to plants or plant products, material objects or the environment, including vectors of pests or pathogens of human and animal diseases and animals injurious to public health.

HAZARD

a property inherent in a substance, biological agent, or situation that may have undesirable consequences (such as properties that may have adverse effects on health, the environment or property).

HEALTH MONITORING

activity that consists of detecting contaminants in the food chain, harmful and quarantine organisms.

INFESTATION (OF A COMMODITY)

The presence in a commodity of a living organism harmful to the plant or plant product concerned. Infestation (by a pest) also includes infection (by a pathogen).

INSPECTION

Examination carried out as part of official control, monitoring or verification of compliance.

INSPECTOR

a person (officer belonging to a public service) authorized by a National Plant Protection Organization to carry out the functions of the latter.

INTERCEPTION (OF A CONSIGNMENT)

Refusal or conditional entry of an imported consignment resulting from non-compliance with phytosanitary regulations.

INTEGRATED PEST MANAGEMENT OR INTEGRATED PROTECTION (IPM: INTEGRATED PEST MANAGEMENT)

Consideration of all available pest control techniques and subsequent integration of appropriate measures that discourage the development of pest populations and keep plant protection products and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment.

INTEGRATED PRODUCTION

an agricultural production system with a low environmental impact, as it involves the coordinated and rational use of all production factors with the aim of minimising the use of technical means that have an impact on the environment or on consumer health.

LABELLING (OF THE PESTICIDE)

all the information affixed or printed directly on the packaging. This information is on the visible label (without having to handle it to access it) or is delocalized in leaflets (separate document accompanying the packaging) or booklets Multi-sheets which are slipped into the box.

LIFE CYCLE OF A PESTICIDE

All the stages in the life of a pesticide, from its production to its degradation in the environment after use, to its destruction as an unused product. The life cycle of a pesticide includes the manufacture, preparation, packaging, distribution, storage, transport, use and final disposal of the product and/or its container.

MAXIMUM RESIDUE LIMIT OR MRL (USUALLY EXPRESSED AS MG OF ACTIVE SUBSTANCE PER KG OF FOOD)

the maximum concentration of a residue that is legally permitted or considered acceptable in or on a food, agricultural product or animal feed product.

MONITORING MECHANISM

a set of activities for collecting, centralising and analysing data, informing stakeholders, coordinating activities, etc., carried out on an ongoing basis according to formalised protocols with a certain level of coordination, for given monitoring methods.

NON-AGRICULTURAL PESTICIDES OR BIOCIDES

chemical or organic substances, synthetic or natural, used in public (vector control) or veterinary hygiene and in other applications such as wood preservation, disinfection or certain domestic uses.

OBSOLETE PRODUCT (PESTICIDE)

plant protection product which has lost some or all of its original qualities or presentation and characteristics; whose technical qualities no longer meet those of the labelling.

OPERATOR

individual operators of primary agricultural products including propagators and breeders; operator groups, associations, and cooperatives; processors and packers; trading companies (including exporters), shippers, consolidators, and cargo handlers.

ORGANIC AGRICULTURE

Organic agriculture is a production system that maintains and improves the health of soils, ecosystems and people. It is based on ecological processes, biodiversity and cycles adapted to local conditions, rather than on the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science for the benefit of the common environment and promotes fair relationships and a good quality of life for all involved (IFOAM). It is a mode of agricultural production that is mainly characterised by the refusal to use synthetic chemical inputs and seeks to return to traditional practices.

PACKAGING

container, with its protective packaging and labelling, used to safely transport goods (e.g., foodstuffs, pesticides, etc.) to the end customer through wholesale and retail distribution channels.

PACKAGING

material used to support, protect or contain a commodity, pesticide or agricultural product.

PATHOGEN

micro-organism that causes a disease.

PATHWAY

Any means that allows the **entry** or **spread** of a **pest** [FAO, 1990; revised FAO, 1995]

PERSISTENCE

the ability of a chemical to retain its molecular integrity and thus its physical, chemical and functional characteristics (e.g., biological activity) in the environment through which it may be transported and distributed for a period of time.

PERSISTENCE

the length of time (expressed in days) during which a product remains active against the agent to be controlled.

PERSISTENCE OF ACTION

capacity of plant protection products to resist the action of transformation and/or elimination, by physical-chemical phenomena (e.g., hydrolysis, volatilisation, degradation by UV, etc.) or by (micro) biological agents, and to remain active for a certain time after application.

PERSISTENT ORGANIC POLLUTANTS (POPS)

chemical substances defined by four properties: their toxicity to human health or the environment, their persistence or persistence in the environment linked to their resistance to degradation, their capacity for progressive concentration in living tissue and the food chain and their capacity to be transported over long distances.

PESTICIDE LABEL

a written text bearing indication for use, safety information and graphic symbols (pictograms), attached or attached to the packaging of the pesticide, to its first container, to its outer container or to the package in which the pesticide is presented for retail sale.

PESTS

organisms that are enemies of plants that harm their growth or subsequent reproduction or multiplication. See “pests”. In food safety, “pests” usually refers to insects, rodents or birds that enter production sites and may be responsible for contamination of products.

PESTICIDES (PLANT PROTECTION PRODUCTS)

any substance or combination of chemical or biological substances that is intended to repel, destroy or control harmful organisms or to be used as a plant growth regulator. Pesticides include the active substance, the commercial speciality or preparation composed of one or more active substances, plant growth regulators, defoliant (to make leaves fall off), desiccants and a number of adjuvants (e.g., wetting agents, humectants).

PESTICIDE MANAGEMENT

regulatory and technical control of all aspects of the life cycle of pesticides, including production (manufacturing and packaging), authorisation, import, distribution, sale, supply, transport, storage, handling, application and disposal (of the product and its container), aimed at minimising the adverse effects of pesticides on health and the environment, as well as human and animal exposure to them. Pesticide management also includes the control of the use of pesticides for agricultural use (e.g., phytolice; verification of application equipment;...).

PEST RISK ANALYSIS

the process of evaluating biological, or other scientific or economic data to determine whether an organism is harmful, whether it should be regulated, and the severity of any phytosanitary measures to be taken against it.

PESTICIDE WASTE

waste consisting, in whole or in part, of pesticides as well as materials contaminated by pesticides. This definition includes rinse water (from rinsing empty containers, tanks and spraying equipment), concentrated products that have expired or have been withdrawn from the market, empty containers, soiled mixing utensils, leftover spray liquid and soiled protective clothing and equipment.

PHYTOSANITARY CERTIFICATE

an official paper document or its official electronic equivalent, conforming to the IPPC model certificates, attesting that a consignment meets the phytosanitary import requirements.

PHYTOSANITARY CONTROL

all the operations of monitoring, checking and treatment of plants or plant products from agricultural, forestry and horticultural resources with a view to eliminating or minimising the harm that harmful organisms associated with these resources may cause to the environment and/or the consumer.

PHYTOSANITARY INSPECTION

official visual examination of plants, plant products or other regulated articles to determine the presence or absence of harmful organisms and/or to ensure compliance with phytosanitary regulations.

PHYTOSANITARY LEGISLATION

basic laws, giving a National Plant Protection Organisation the legal authority to implement phytosanitary regulations.

PHYTOSANITARY REGULATIONS

a set of official regulations to prevent the introduction or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests, including the establishment of procedures for phytosanitary certification.

PHYTOSANITARY RISK

the probability of introduction and spread of a pest and the magnitude of the potential economic consequences associated with it (for quarantine pests) and the probability that a pest present in plants for planting will affect the intended use of those plants with unacceptable economic impact (for regulated non-quarantine pests).

PHYTOSANITARY SECURITY (OF A CONSIGNMENT)

maintaining the integrity of a consignment and preventing its infestation and contamination by regulated pests through the application of appropriate phytosanitary measures.

PHYTOSANITARY WATCH

official process of collecting and recording data on the presence or absence of harmful organisms using surveys, monitoring or other methods.

PLANTS

living plants and living parts of specified plants, including seeds.

PLANT PRODUCTS

unmanufactured products of plant origin (including grains), as well as manufactured products which, because of their nature or that of their processing, may constitute a risk of introduction or spread of harmful organisms.

PLANT PROTECTION

activity which aims, among other things, to identify the agronomic, biological and cultural components involved in problems closely related to the health of plant species and whose role is to implement all legal, administrative, technical and logistical means available to safeguard the health of plants and plant products.

PLANT PROTECTION PRODUCTS

term established by international regulations to designate preparations containing one or more mineral or organic chemical substances, whether synthetic or natural, presented in the form in which they are supplied to the user. More commonly referred to in the Guide as “pesticides”. They are also referred to as “plant protection products” or “PPPs” plant protection products. Depending on the category, a distinction is made between insecticides, fungicides, nematocides, molluscicides, herbicides.

POINT OF ENTRY AND EXIT

airport, seaport, land border post or any other officially designated location for the import of consignments, or the arrival of persons.

POISON CONTROL CENTRE

information centre on the toxic risks of all medicinal, industrial and natural products (e.g., poisonous mushrooms). It is a centre of technical expertise on toxic substances and their effects on health. It is at least an information service that provides emergency information. Some centres also have a toxicology laboratory and/or a clinical treatment unit.

POLLUTION

degradation or alteration of the environment, generally linked to human activity by the direct or indirect diffusion of chemical, physical or biological substances that are potentially toxic to living organisms or that disrupt to a greater or lesser extent the natural functioning of ecosystems.

PREPARATION

combination of various compounds, including at least one active substance, aimed at making the product safe and effective for the intended purpose and the intended mode of application.

PROHIBITED

a pesticide whose all uses have been banned by final regulatory action to protect human health or the environment. Applies to a pesticide whose registration has been rejected for a first use or which has been withdrawn by industry from the sub-regional market or by a Member State, where it is clear that such action has been taken to protect human health or the environment.

PROHIBITION

phytosanitary regulation prohibiting the import or release of harmful organisms or specific goods.

QUALITY OR CONFORMITY CONTROL

this is the control carried out by approved national bodies for the quality and/or conformity control of food and beverages for commercial quality and safety standards. Quality or conformity control can also apply to several other articles or products; pesticides, fertilisers, agricultural equipment for pesticide application, personal protective equipment (PPE).

QUARANTINE

official containment of regulated articles, pests or useful organisms for inspection, analysis, treatment, observation or research.

QUARANTINE AREA

An **area** within which a **quarantine pest** is present and is being **officially controlled** [FAO, 1990; revised FAO, 1995]

QUARANTINE PEST

a pest that is of potential importance to the economy of the threatened area and is either not yet present in the area or is present but not widely distributed and is under official control.

QUARANTINE STATION

Official station for holding plants or plant products or other regulated articles, including beneficial organisms, in quarantine [FAO, 1990; revised FAO, 1995; formerly “quarantine station or facility”; CPM, 2015]

RECONDITIONING

the transfer of a pesticide from one authorized commercial package to another, usually smaller (and often not intended for this use) container for subsequent retail sale.

REGISTRATION

the process by which the competent national or regional authorities approve the sale and use of a pesticide (or other input) after consideration of comprehensive scientific data showing that the product is effective for its intended uses and does not present an unreasonable risk to human and animal health and the environment.

REGULATED NON-QUARANTINE PEST

a pest which is not a quarantine pest, the presence of which in plants intended for planting affects the intended use of such plants, with unacceptable economic impact, and which is therefore regulated in the territory of the importing Contracting Party.

REGULATED PEST

quarantine pest or regulated non-quarantine pest.

RESIDUE

a trace of one or more substances present in or on plants or plant products, edible products of animal origin, or elsewhere in the environment, and constituting a residue from the use of a pesticide, including its metabolites and products of degradation or metabolism.

RISK MANAGEMENT

the process, distinct from risk assessment, of weighing policy options in consultation with interested parties, taking into account risk assessment and other legitimate factors, and, where necessary, selecting appropriate prevention and control measures. Risk management is one of the three elements of risk analysis.

RISK

The combination of probability and severity of an adverse effect on human health or the environment, which is a function of the nature of the hazard, the probability and magnitude of exposure to the pesticide.

SAMPLING

operation of taking a sample in a survey work (this may be an elementary operation or a set of operations consisting of successive stages of sampling separated by stages of fragmentation, homogenisation, drying, etc.). The aim is to study a selected part in order to draw conclusions applicable to a whole. Sampling is directed and sampling is carried out on the basis of targeting criteria in order to increase the probability of detecting contamination in the target population. Sampling of plants, plant products and other regulated commodities may take place prior to export, at the time of import or at other stages as decided by NPPOs.

SANITARY AND PHYTOSANITARY MEASURES

any legislation, regulation or official method designed to prevent the introduction or spread of quarantine pests or to limit the economic impact of regulated non-quarantine pests. These are the measures adopted:

- a. to protect animal or plant life or health within the territory of the Member from risks arising from the entry, establishment or spread of pests, diseases, disease-carrying organisms or disease-causing organisms.
- b. to protect human and animal life and health within the territory of the Member from risks arising from additives, contaminants, toxins or disease-causing organisms in food, beverages or feedstuffs.
- c. to protect human life and health within the territory of the Member from risks arising from diseases carried by animals, plants or their products, or from the entry, establishment or spread of pests; or,

- d. to prevent or limit other damage in the territory of the Member arising from the entry, establishment or spread of pests. Sanitary or phytosanitary measures include all relevant laws, decrees, regulations, requirements and procedures, including, inter alia, end-product criteria; production processes and methods; testing, inspection, certification and approval procedures; quarantine regimes, including relevant requirements related to the transport of animals or plants or materials necessary for their survival during transport; provisions on relevant statistical methods, sampling procedures and risk assessment methods; and packaging and labelling requirements directly related to food safety.

SEVERELY RESTRICTED PESTICIDE

a pesticide for which almost all uses have been prohibited by final decision of the competent authority in order to protect human health or the environment, but for which one or more specific uses remain authorized. The term applies to a pesticide for which registration for substantially all uses has been refused or which has been withdrawn by industry either from the market or from the national registration process where it is clear that such action has been taken to protect human health or the environment.

SUBSTANCES

chemical elements and their compounds as they occur in the natural state or as produced by industry, including any impurities inevitably resulting from the manufacturing process. This term includes any additive necessary to preserve the stability of the product as well as any impurity produced by the process used.

SUBSTANCE OF CONCERN MEANS

any substance, other than the active substance, which is inherently capable of causing an adverse effect on humans, animals or the environment and which is contained or produced in a biocidal product in a concentration sufficient to cause such an effect. Such a substance, unless there are other grounds for concern, would normally be classified as a dangerous substance.

SURVEILLANCE

an official device whose function is to collect by survey, monitoring or other methods and to archive data on the presence or absence of harmful organisms.

SURVEILLANCE PLAN

a non-targeted control programme which makes it possible to obtain an estimate of the prevalence or level of contamination by one or more agents in a defined production (target population) and thus to estimate the risk of consumer exposure to this hazard.

SUSTAINABLE AGRICULTURE

Sustainable Agriculture is generally defined as a way of farming that meets the needs of the present without compromising the ability of future generations to meet their own needs. It is a mode of production that applies principles of sustainable development to agriculture while respecting the ecological, economic and social limits that ensure the sustainability of this production over time. It does not damage the integrity of people, living beings and their environment. Sustainable agriculture limits the use of pesticides that can harm the health of operators and consumers and aims to protect biodiversity.

TOXICITY

Physiological or biological properties that cause a chemical product to damage or alter a living organism by other than mechanical means.

TOXIC OR POISON

substance capable of disturbing the normal functioning of a living organism. It may be natural (e.g., dust, pollen) or artificial (e.g., urea formaldehyde), chemical (e.g., acetone) or biological (e.g., aflatoxins, anthrax) in nature.

TOXICOVIGILANCE

aims to monitor the toxic effects on humans of a product, substance or pollution in order to carry out alert, prevention, training and information actions.

USE AND APPLICATION

way of using substances or products.

VISUAL EXAMINATION

examination with the naked eye, using a magnifying glass, stereoscope or other optical microscope.

2.11. ABBREVIATIONS AND ACRONYMS

Table 4 — Abbreviations and Acronyms

ACP	Africa, Caribbean, Pacific
CCP	Critical Control Points
CPS	Critical points (in a process)
CODEX	Codex Commission. The Codex Alimentarius (or Codex Alimentarius) is a joint programme of the Food and Agriculture Organization of the United Nations (FAO) and the World Health Organization (WHO) consisting of a collection of standards, codes of practice, guidelines and other recommendations.
COLEACP	Committee Linking Entrepreneurship, Agriculture, Development
CAN	Calcium Ammonium Nitrate
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GAP	Good Agricultural Practices (defines the conditions of use of a PPP)
GHP	Good Hygiene Practices
GMO	Genetically modified organism
GPG	Good Practice Guide
GPP	Good Phytosanitary Practices
HACCP	Hazard Analysis and Critical Control Points
IPPC	International Plant Protection Convention
ISPM	International Standards for Phytosanitary Measures
ISO	International Organization for Standardization

ILO	International Labour Organization
LD	Determination Limit (synonymous with LOQ)
LOQ	Limit of Quantification
MRL	Maximum Residue Limit
NPPO	National Plant Protection Organisation
PA	Points of Attention (in a process)
PHI	Pre-harvest Interval
PPP	Plant protection product
PRP	Prerequisite Programmes
QMS(S)	Quality Management System (Sanitary and Phytosanitary)
SMEs	Small or Medium Enterprises
SPS	Sanitary and Phytosanitary
WHO	World Health Organization
WTO	World Trade Organization
TSP	Triple Superphosphate

2.12. THE CHALLENGES OF NOT RESPECTING COMMERCIAL, SANITARY AND PHYTOSANITARY QUALITY IN THE INDUSTRY

Notifications received in Kenya on beans and peas in pods continue to rise year by year raising doubts as to whether Kenya will continue to be in this market in the foreseeable future. Despite the efforts being made by some exporters to adhere to internationally accepted best practice, beans and peas in pods from Kenya still continue to receive notifications for non-conformities in the European market. The year 2020 recorded 56 notifications while the year 2021 received 57 notifications. September 2020 had the highest notifications at 12 in number while the highest in 2021 was in July where 13 notifications in total were received. The year 2022, up to October received 60 notifications. These high figures and their frequency do not augur well for the Country and might result in serious business repercussions including a total ban of beans from Kenya in these markets. The trace notifications in 2021 came from Netherlands (18), France (16), Belgium (5), United Kingdom (3), and Germany (2). The notifications from February, March, April, July, August, and September 2021 were as a result of **Acephate & Methamidophos**, except June where the notification was due to the presence of **Chlorpyrifos, Cifluthrin, Acephate and Methamidophos**. Detection of banned pesticide molecules or exceeded limits in Kenya green beans has led to decline in exports robbing Kenya a significant market share. The main cause for the notifications as in the previous years was MRLs (80%), while the remaining 20% was due to quarantine/regulated pests as well as wrong documentations. (Source: https://food.ec.europa.eu/safety/rasff-food-and-feed-safety-alerts_en)





3

**ECONOMIC
AND SOCIAL
STRUCTURE
OF THE BEANS
AND PEAS
SECTOR**

3.1. SIZE AND CHARACTERISTICS OF THE COMPANIES IN THE SECTOR

Data from Kenya Population and Housing Census 2019 indicate that overall, the Country had a total of 3,600,840 smallholder farmers directly engaged in the production of beans. However, a much earlier data by SNV 2012, USAID/KAVES 2015 estimated that about 50,000 operators were engaged in the production of green beans. The Domestic Horticultural Markets study by Farm Concern International further stated that in the year 2014-2015 a total of 1,300,288 casuals and 1,031,314 full time employees were engaged in the various farm activities such as land preparation, planting, weeding and value addition in the French beans value chain alone.

The sector is characterized by farms with an average size of 5 ha with production areas ranging from 2 ha to more than 10 ha. The total quantity of green beans *Phaseolus vulgaris* (also called French beans or Mishiri locally) produced in 2017 is estimated at 62,000 MT on an area of 7,500 ha: grown by smallholders on 4,500 ha and large operators on 3,000 ha. The yields vary from about 4,000 kg/ ha to 12,500 kg/ha, depending on farming practices, varieties grown, and general agricultural production conditions (especially water availability through rainfall or irrigation). Harvests occur several times per year and are dependent on the geographical position of farms. As can be seen from **figure 2** below, the production of beans and peas in pods has been somehow constant in the period between 2016 to 2019.

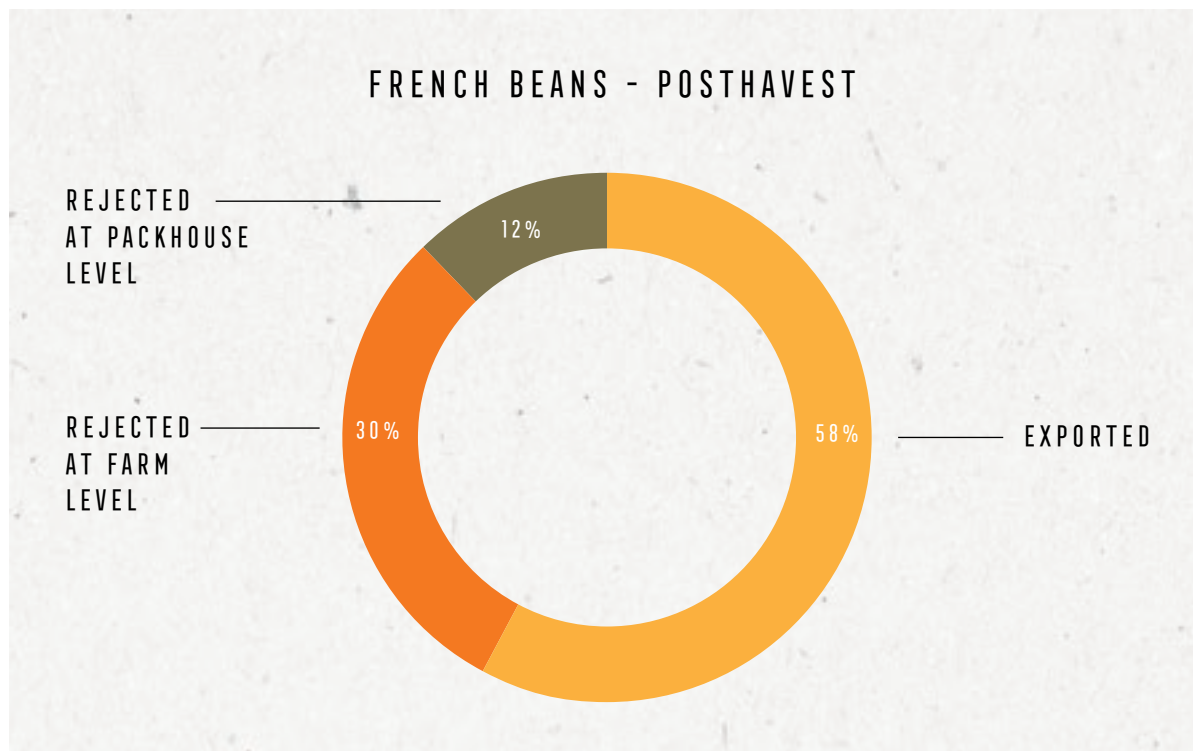
In order to have a streamlined supply chain and assure consumers of food safety, most export companies have their own farms where they source their supplies. Additionally, they have contracted large and medium scale operators under contract and supervision by the exporting companies. The smallholder operators are put into clusters by the exporting companies for ease of aggregation of the farm produce before collection and delivery to various packhouses in and around Nairobi. In Kenya, the peak export market is between October and May.

It is estimated that 59000 MT of beans go to the export market supply chain whereas 7000MT are rejected at farm level, while an estimated 18000MT are rejected at the Pack House level leaving only 34000MT for export mainly to the European Union market. The main importing countries of processed beans are France, followed by Belgium and the United Kingdom (See **figure 3** below). The canning factories also contract smallholder operators who overall produce an estimated 3000MT (See **Figure 1** below). At the factory level, however, an estimated 900MT is rejected. The rejected produce is either sold to the domestic fresh market, or to animal feed manufacturing companies. The main reason for rejection for the sampled companies include quality defects such as size, discoloured, shape, rust etc.

Consumption of beans on pods at the local market is not significant compared to the export market. However, those that do not meet the stringent export market requirements are sold onto the domestic market for local consumption or to the animal feed manufacturers. This possess a significant risk to local consumers who unknowingly end up ingesting food of a lower grade that are largely harmful to their health. There is need therefore for the Competent Authorities to ensure

strict adherence to KS 1758, a Kenyan Standard that covers issues of food safety, environmental sustainability, and social accountability.

Figure 1 — French beans postharvest volume distribution



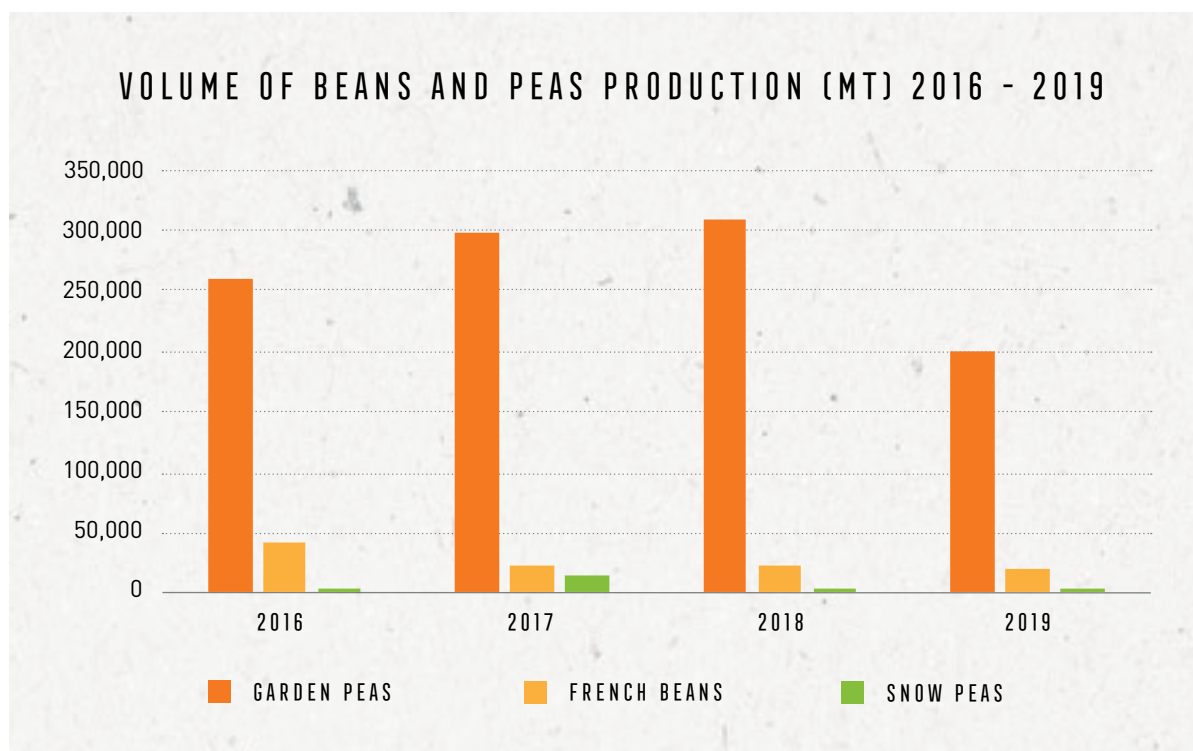
The rejections at farm and Pack House levels are due to non-compliance with MRL standards as well as pests and disease infestations. The largest operator and exporter of beans in Kenya works with 11 suppliers, 7 farms, and approximately 1,700 smallholder operators located in major producing areas of Kenya, amongst others Naivasha, Loitokitok and Taita. The Company grows and packs a wide range of quality vegetables, all year round, specializing in fresh produce and complex added value lines of packed mixes of produce. The company’s operations and activities in the outgrower initiative include support, training and extension advice to smallholder operators who generally produce French beans as a cash crop on small areas of land that on average do not extend to more than half an acre.

Data from ITC Trade Maps (2021) indicates that the largest exporter in this sector has about 3,400 employees with the second largest having about 2000 employees working both at the farms and at the Pack House. The smallest companies in the sector however have an average of 10 employees indicating the diversity in terms of company sizes.

3.2. PARTICULARITIES OF THE MARKET(S) CONCERNED

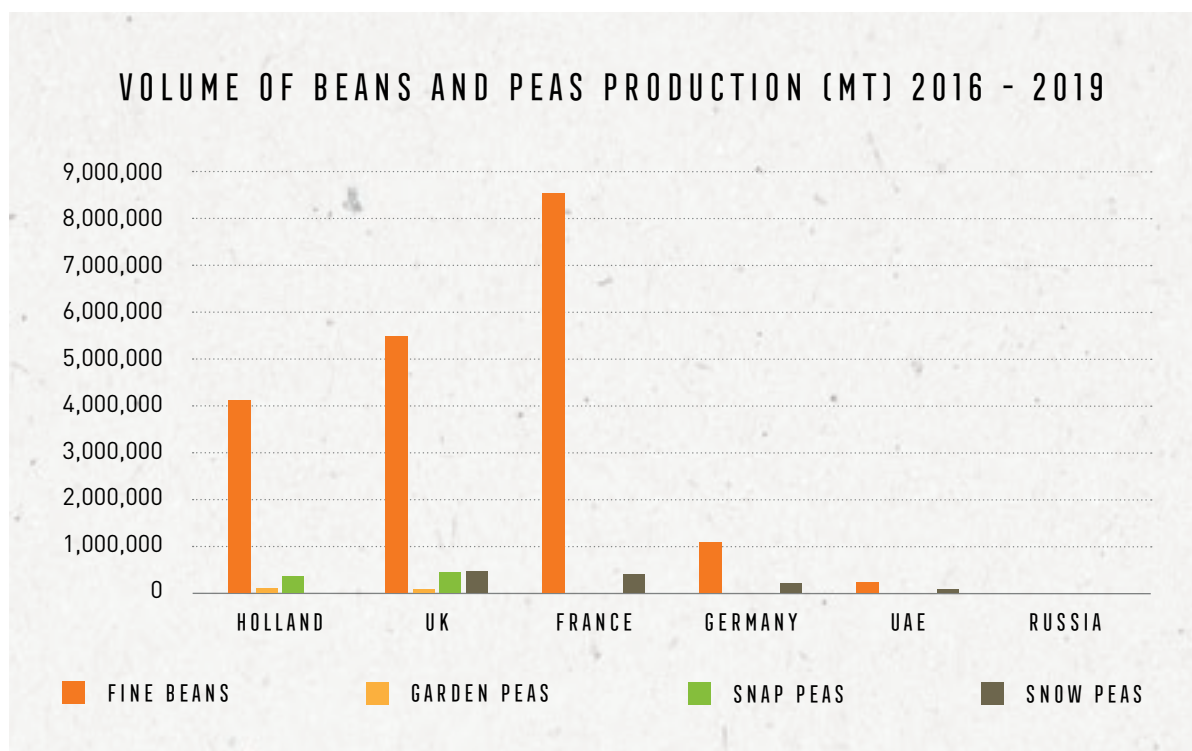
These markets at minimum require Global G.A.P. certification for on farm production and food safety management system certification for packhouse operations e.g BRC. Some buyers will additionally require Albert Heijn Protocol and LEAF Marque. These are an add-on requirement to the GLOBALG.A.P for exporters targeting the EU market including the UK. Fresh vegetable exports outside of Europe do not demand these certifications. However, this market accounts for only 0.4 percent of the total fresh vegetable exports as can be seen in **figure 3** below.

Figure 2 — Volume of Beans and Peas Produced (MT) 2016 – 2019



Source: HCD Validated Horticulture Report (2017-2018) and (2018-2019)

Figure 3 — Volume of beans and peas - major export destinations



Source: HCD 2018

The United Kingdom. The U.K. imports are channelled increasingly directly to the supermarkets through distributors who are closely linked to the exporters. While there are some loose packed green beans in 2.2 kg cartons, increasing volumes are going as pre-pack to the U.K. The supermarkets in the U.K. are the biggest buyers and prefer to cut out middlemen and go straight to the operator. British import and distribution companies can provide the specific link between the exporter and the supermarket. Their conditions are the most stringent, but they are also willing to offer the best fixed contracts, with prices and volumes negotiated well in advance. The preferred beans in the U.K. are the “fine” beans. The UK imports comprised 31.65% of total imports.

France. The French market is still largely concentrated on the fresh produce markets, transiting through the wholesale markets in Rungis (Paris) and Lyon. The French supermarkets still procure much of their product at the wholesale markets, though they also contract directly with specific growers to provide them with their pre-pack. The French consumer still largely prefers the extra fine beans, which are often in short supply so prices remain high. The imports from France comprised 32.73% of total imports

Other markets. The other main markets in Europe include Germany, the Netherlands and Belgium, but these are definitely in an inferior position to the U.K. and France. The Dutch tend to prefer working through the auction system, while the Germans follow the British system more closely.

Although Belgium is the largest importer of beans and peas, the United Kingdom and the Netherlands were the principle importers from developing countries in 2017, especially in off-season periods (from September to June).

The United Kingdom is an important destination for sugar snaps and snow peas from Guatemala (4.3 thousand tonnes in 2017), Zimbabwe (2.6 thousand tonnes) and Kenya (1.8 thousand tonnes).

The Netherlands is considered to be an important entrance into the European market, importing from such diverse sources as Guatemala (3.1 thousand tonnes in 2017), Zimbabwe (2.5 thousand tonnes), Kenya (1.5 thousand tonnes) and Peru (one thousand tonnes).

Belgium imports a large amount of beans and peas from France and the Netherlands, with a smaller share directly from developing countries. A great deal of this produce is local and destined for the processing (canning and freezing) industry. (Source: <https://www.cbi.eu/market-information/fresh-fruit-vegetables/beans-peas-other-leguminous-vegetables>)

3.3. DEFINITION OF THE PRODUCTS

In tables 5 and 6 below, varieties of French beans and Peas that are majorly grown in Kenya have been highlighted. The seeds are available from approved agrovet shops especially in beans and peas in pods growing areas.

Table 5 — Beans - *Phaseolus vulgaris* L. – (Fresh) and their characteristics

VARIETY	FURTHER PRODUCT INFORMATION
SERENGETI	<ul style="list-style-type: none"> — Pod length:14-16cm — Pod Diameter: 6-8mm — Pod Shape: circular and straight — Pod Colour: uniform dark green glossy — Maturity – 55 days — Tolerant to Rust, Bean Common Mosaic and Anthracnose
BOSTON	<ul style="list-style-type: none"> — Pod length:14 - 15cm — Pod Diameter: 8 - 9mm — Pod shape: circular and straight — Pod Colour: uniform dark green — Maturity – 56 days — Tolerant to Bean Common Mosaic and Anthracnose
BELCAMPO	<ul style="list-style-type: none"> — Well suited to heavy soils — Podlength:12 - 13cm — Pod diameter:6-8mm — Pod shape: circular and straight — Pod colour: Medium dark green — Maturity – 54 days — Tolerant to Bean Common Mosaic and Anthracnose
LOMAMI	<ul style="list-style-type: none"> — An extra fine/fine bean with vigorous growth well suited to heavy soils — Pod length:12 - 13cm — Pod diameter:6 - 8mm — Pod Colour: medium dark green — Maturity – 54 days — Tolerant to Bean Common Mosaic and Anthracnose
HAWAII	<ul style="list-style-type: none"> — An extra fine bean with excellent plant and pod uniformity — Podlength:11 - 13cm — Pod diameter:6.5 - 8mm — Pod shape: circular and straight — Pod Colour: uniform green glossy — Maturity – 65 days — Tolerant to Anthracnose, Bean Common Mosaic and PsP (Halo Blight)

MOONSTONE	<ul style="list-style-type: none"> — An extra fine/fine bean with excellent plant habit and pod uniformity — Podlength:13 - 15cm — Pod diameter: 6 - 8mm — Pod shape: circular and straight — Pod colour: uniform dark green glossy — Maturity -55 days — Tolerant to Rust — Tolerant to Bean Common Mosaic — Tolerant to PsP
PICASSO	<ul style="list-style-type: none"> — An extra fine/fine bean with excellent plant habit and pod uniformity — Pod length:13 - 15cm — Pod diameter:6 - 8mm — Pod shape: circular and straight — Pod colour: uniform dark green glossy — Maturity - 57 days — Tolerant to Rust, Bean Common Mosaic and to PsP
BUFFALO	<ul style="list-style-type: none"> — Suited to warmer climatic conditions — Pod length: 12 - 14 cm — Pod diameter: - 9 - 11 mm — Pod shape: circular and straight — Pod colour: uniform dark green — Maturity: 56 days — Tolerant to Bean Common Mosaic and Anthracnose — Intermediate tolerance to rust
GOLD PLAY	<ul style="list-style-type: none"> — An extra fine yellow wax bean with excellent plant habit and pod uniformity — Pod length:11 - 12cm — Pod diameter:6.5 - 8mm — Pod shape: circular and straight — Pod colour: uniform golden yellow — Plant height: medium — Maturity: 65 days — Tolerant to Bean Common Mosaic — Tolerant to Anthracnose; Intermediate tolerance to rust
SEAGULL	<ul style="list-style-type: none"> — Podlength:13 - 14cm — Pod diameter:6.5 - 8mm — Pod shape: circular and straight — Pod colour: medium dark green — Maturity – 65 days — Tolerant to Bean Common Mosaic and PsP (Halo Blight) — Intermediate tolerance to Rust

There are, however other common beans varieties not listed above but are also widely grown in Kenya. These varieties include Samantha, Vanilla, star 2054/53, Amy, Kiboko,Goal amongst others

Table 6 — Peas *Pisum sativum* sp. (Fresh) and their characteristics

VARIETY	FURTHER PRODUCT INFORMATION
CASCADIA	<ul style="list-style-type: none"> — A standard leaf snap pea variety, well adapted to warmer climatic conditions — Pod length: 8 cm — Pods: straight and dark green — Average nodes until first flowering: 16 — Maturity: 75 days — Uniform attractive dark green pods — Very high yield — Intermediate tolerance to Powdery Mildew
SWEET HORIZON	<ul style="list-style-type: none"> — A semi string-less snow peas variety — Pod length: 9 - 10 cm — Pods: straight, flat and dark green — Average nodes until first flowering: 16 — Maturity: 72 days — Straight dark green pods — Intermediate tolerance to powdery Mildew
OREGON SUGAR POD II	<ul style="list-style-type: none"> — A leaf variety with good heat tolerance — Pod length: 9 cm — Pods: straight, flat and dark green — Average nodes until first flowering: 16 — Maturity: 72 days — Straight dark green pods — Intermediate tolerance to Powdery Mildew

The list above is also not exhaustive as other common bean varieties that include Kennedy are not included but are also widely grown in Kenya.

3.4. QUALITY - MINIMUM CHARACTERISTICS TO BE MET BY THE PRODUCTS (SOURCE: OECD-INTERNATIONAL STANDARDS FOR FRUITS AND VEGETABLES: BEANS)

The International Standards for Fruits and Vegetables gives clarity in terms of quality parameters for beans and peas in pods as can be seen below. These are the specifications that guide both growers and exporters in order to comply with market requirements.

A: BEANS

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

- intact
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded
- clean, practically free of any visible foreign matter
- fresh in appearance
- free from parchment (hard endoderm)
- practically free from pests
- practically free from damage caused by pests
- free of abnormal external moisture
- free of any foreign smell and/or taste.

The seeds must be:

- fresh
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded
- normally developed in shelling peas
- practically free from pests
- practically free from damage caused by pests
- free of any foreign smell and/or taste.

The development and condition of the beans must be such as to enable them:

- to withstand transportation and handling
- to arrive in satisfactory condition at the place of destination.

I. PRODUCT MATURITY CRITERIA

- Colour – mid to dark green
- Size – Length (90 mm -150mm) Diameter – (5 mm -7.5 mm)
- Shape – Straight and cylindrical
- Crispy no visible dehydration and free from allergens

II. CLASSIFICATION OF PRODUCTS

Beans are classified in three classes, as defined below:

1. EXTRA" CATEGORY

The beans in this class must be of superior quality. They must be characteristic of the variety and/or commercial type. They must be:

- Turgid
- Easily snapped
- very tender
- practically straight
- String less.

Seeds, if present, must be small and soft. However, needle beans must be seedless.

They must be free from defects, with the exception of very slight superficial defects, provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package. They must be free from defects with the exception of very slight superficial defects provided these do not affect the general appearance of the produce, the quality, the keeping quality and presentation in the package.

2. CLASS I

The beans in this class must be of good quality. They must be characteristic of the variety and/or commercial type. They must be:

- turgid
- young and tender
- practically stringless except in the case of beans for slicing. Seeds, if present, must be small and soft.

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

- A slight defect in shape;
- Slight defects in colouring;
- Slight skin defects.

3. CLASS II

This category includes beans which do not qualify for inclusion in the higher classes, but satisfy the minimum requirements specified above. They must be

- reasonably tender
- Free from rust spots in the case of needle beans.
- Seeds, if present, should not be too large and must be reasonably soft.
- The following defects may be allowed, provided the fruit retain their essential characteristics as regards the quality, the keeping quality and presentation:
 - defects in shape
 - defects in colouring
 - skin defects
 - strings
 - Slight rust spots except in the case of needle beans.

III. PROVISIONS CONCERNING SIZE OF THE PRODUCTS

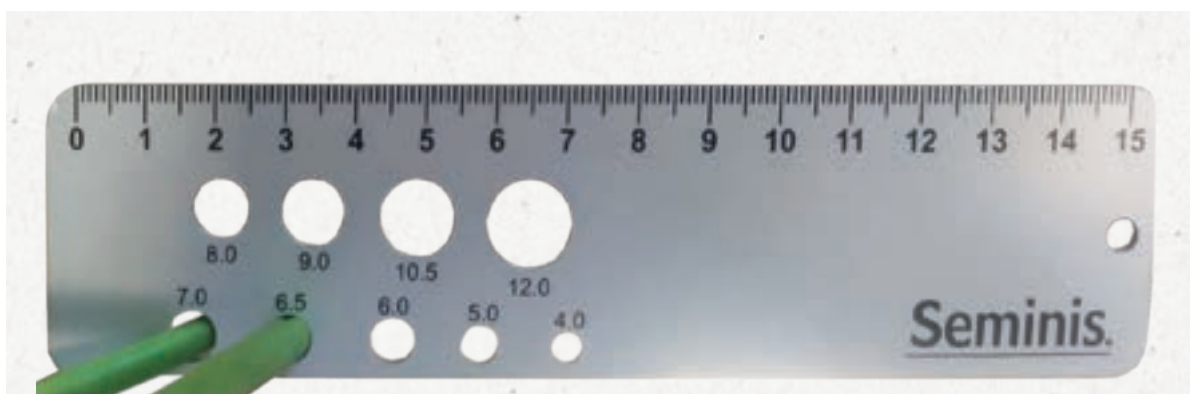
Size is determined by the maximum width of the pod measured at right angles to the seam. To ensure uniformity in size, needle beans in the same package shall not exceed:

- 6 mm when marked “very fine”
- 9 mm when marked “fine”
- 12 mm when marked “medium

Quality and Size Tolerances

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

Figure 4 — Confirmation of size tolerances of peas in the packhouse



1. EXTRA" CATEGORY

A total tolerance of 5 per cent, by number or weight, of beans not satisfying the requirements of the class but meeting those of Class I is allowed. Within this tolerance not more than 0.5 per cent in total may consist of produce satisfying the requirements of Class II quality.

Figure 5 — Extra Fine Beans - Diameter 7.0 - 7.5mm; Length 90 - 120mm



2. CLASS I

A total tolerance of 10 per cent, by number or weight, of beans not satisfying the requirements of the class but meeting those of Class II is allowed. Within this tolerance not more than 1 per cent in total may consist of produce satisfying neither the requirements of Class II quality nor the minimum requirements, or of produce affected by decay. No tolerance is allowed for produce affected by *Colletotrichum lindemuthianum* (bean spot disease).

Within this tolerance, a maximum of 5 per cent, by number or weight, may have strings in the case of a variety and/or commercial type that should be stringless. In addition, a maximum of 15 per cent, by number or weight, of beans (excluding needle beans) may have the stalk and a small section of the narrow part of the neck missing, provided these pods remain closed, dry and not discoloured.

3. CLASS II

A total tolerance of 10 per cent, by number or weight, of beans satisfying neither the requirements of the class nor the minimum requirements is allowed. Within this tolerance not more than 2 per cent in total may consist of produce affected by decay. No tolerance is allowed for produce affected by *Colletotrichum lindemuthianum* (bean spot disease). In addition, a maximum of 30 per cent, by number or weight, of beans (excluding needle beans) may have the stalk and a small section of the narrow part of the neck missing, provided these pods remain closed, dry and not discoloured.

Size Tolerances

For all classes (if sized): a total tolerance of 10 per cent, by number or weight, of beans not satisfying the requirements as regards sizing is allowed.

IV. HOMOGENEITY OF PRODUCTS

The contents of each package must be uniform and contain only beans of the same origin, variety or commercial type, quality and size (if sized). The visible part of the contents of the package must be representative of the entire contents.

V. PACKAGING

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

Figure 6 — French Beans - Loose pack

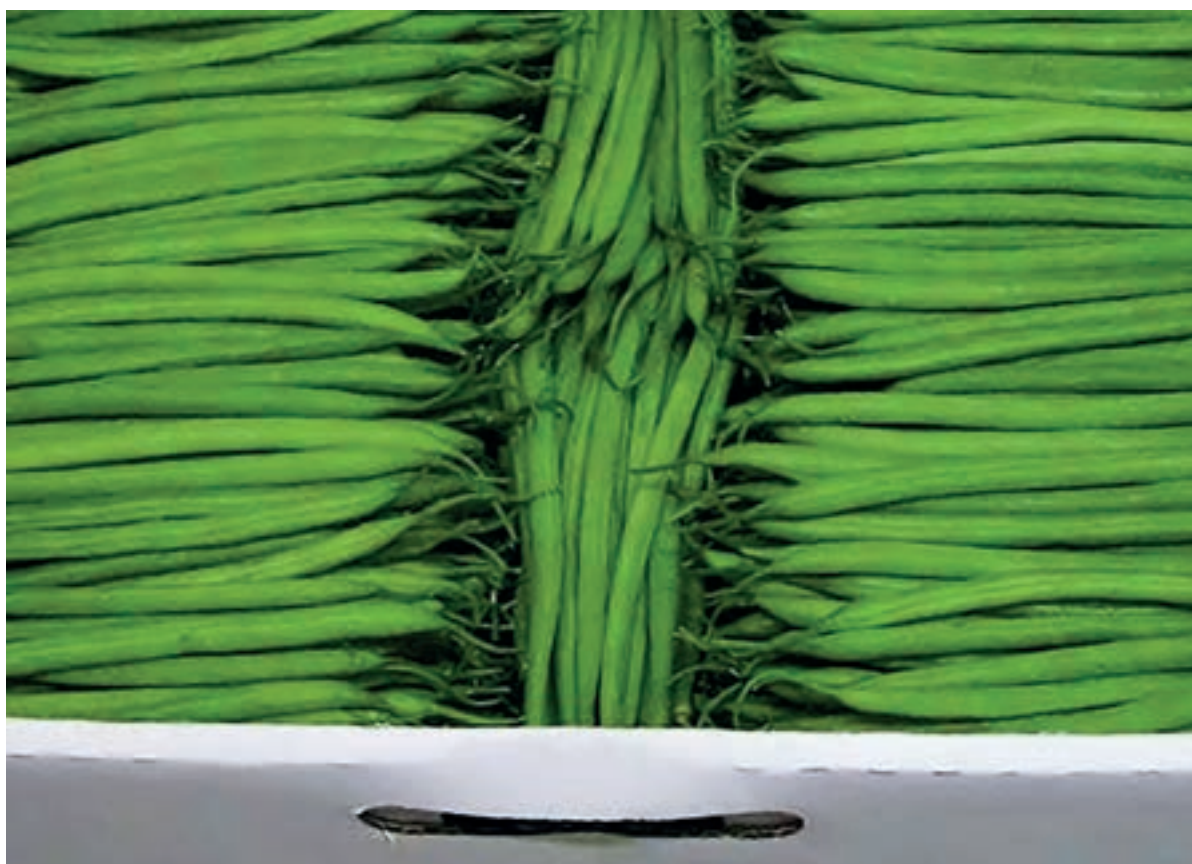


Figure 7 — Snow Peas in punnets



VI. MARKING OF PRODUCTS

Each package must bear the following particulars, in letters grouped on the same side, legibly and indelibly marked and visible from the outside. (*These markings provisions do not apply to sales packages presented in packages, but do not apply to sales packages {pre- packages} packed individually*):

- Packer and/ or shipper/ exporter:
- Name and address (eg, street/city/ region/ postal code, and country if different from the country of origin)
- Name of the product if the contents are not visible from the outside
- Name of the variety (*may be replaced by a synonym*) *A brand name may only be indicated in addition to the variety or a synonym*). *In case of a mixture of distinctly different varieties or species, names of different varieties or species. Indicate: "mixture of.... " if the produce is not visible from the outside, the commercial types and/ or colors and the quantity of each product contained in the package must be indicated.*)
- Origin of the produce:
- Country or area of origin
- Class
- Calibre
- Official control mark (optional)

For beans transported in bulk (direct loading into a transport vehicle), these particulars must appear on a document accompanying the goods affixed visibly inside the vehicle.

B. PEAS - *PISUM SATIVUM L*

Minimum characteristics to be met by the products

In all classes, subject to the special provisions for each class and the tolerances allowed:

The pods must be:

- intact; however, mange tout and sugar snap peas that have had their ends removed are allowed.
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded,
- clean, practically free of any visible foreign matter (including parts of the flowers),
- free from hard filaments or films in mange tout peas and sugar snap peas,
- practically free from pests, practically free from damage caused by pests,
- Free of abnormal external moisture free of any foreign smell and/or taste.

The seeds must be:

- fresh
- sound; produce affected by rotting or deterioration such as to make it unfit for consumption is excluded,
- practically free from pests,
- practically free from damage caused by pests,
- free of any foreign smell and/or taste, normally developed in shelling peas.

The development and condition of peas must be such as to enable them

- to withstand transport and handling, and;
- to arrive in satisfactory condition at the place of destination

I. PRODUCT MATURITY CRITERIA COLOUR

- Mid-green Shape - straight and flat pods Size - Length (6 mm - 9 mm)
- Free from seeds, fresh and crunchy with no strings, free from diseases, pests and allergens

II. CLASSIFICATION OF PRODUCTS

Peas are classified into classes, as defined below:

1. CLASS I

Peas in this class must be of good quality. They must be characteristic of the variety and/or the commercial type.

The pods must be:

- fresh and turgid
- free from damage caused by hail
- free from damage caused by heating for shelling peas:
- the pods must be:
 - with peduncle attached
 - well filled, containing at least five seeds;
- the seeds must be:
 - well formed
 - tender
 - succulent and sufficiently firm, i.e., when squeezed between two fingers they should become flat without disintegrating
 - at least half the full-grown size but not full grown
 - non-farinaceous
 - undamaged, without cracks in the skin of the seeds

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

- slight skin defects, injuries and bruises,
- Slight defects in shape.
- Slight defects in colouring. For mange tout peas and sugar snap peas: the seeds, if present, must be small and underdeveloped.

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

- a very slight defect in shape
- very slight defects in colouring
- very slight skin defects, injuries and bruises.

2. CLASS II

This class includes peas which do not qualify for inclusion in class I but satisfy the minimum requirements specified above.

For shelling peas:

- the pods must contain at least three seeds
- they may be more developed than those in class I, but over-mature peas are excluded

The following defects may be allowed provided the peas retain their essential characteristics as regards the quality, the keeping quality and presentation:

- defects of the pods:
 - skin defects, injuries and bruises provided they are not progressive and there is no risk of the seeds being affected
 - some loss of freshness, excluding wilted pods.
- defects of the seeds:
 - a slight defect in shape
 - a slight defect in colouring
 - slightly harder
 - Slightly damaged.

For mange-tout peas and sugar snap peas:

The seeds, if present, may be slightly more developed than in Class I.

The following slight defects may be allowed provided the peas retain their essential characteristics as regards the quality, the keeping quality and presentation:

- slight defects in shape, including those due to seed formation
- slight defects in colouring
- slight skin defects, injuries and bruises
- Some loss of freshness excluding wilted pods.

III. SIZE OF THE PRODUCTS

There is no sizing requirement for peas.

IV. PROVISIONS CONCERNING TOLERANCES QUALITY AND SIZE TOLERANCES

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

- Class I - 10% by weight of peas not satisfying the requirements of the class, but meeting those of class II or, exceptionally, coming within the tolerances of that class.
- Class II - 10% by weight of peas satisfying neither the requirements of the class nor the minimum requirements, with the exception of produce affected by rotting, progressive diseases or any other deterioration rendering it unfit for consumption.

V. PROVISIONS CONCERNING PRESENTATION

UNIFORMITY

The contents of each package must be uniform and contain only peas of the same origin, variety or commercial type and quality.

The visible part of the contents of the package must be representative of the entire contents.

PACKAGING

Peas must be packed in such a way as to protect the produce properly. The materials used inside the package must be clean and of a quality such as to avoid causing any external or internal damage to the produce. The use of materials, particularly of paper or stamps bearing trade specifications, is allowed, provided the printing or labelling has been done with non-toxic ink or glue. Packages must be free of all foreign matter. Stickers individually affixed on product shall be such as, when removed, neither to leave visible traces of glue, nor to lead to skin defects.

Figure 8 — Extra Fine Beans (Top and Tail TT) processing in punnets at the packhouse



VI. PROVISIONS CONCERNING MARKING IDENTIFICATION

- Packer and/or dispatcher/exporter: Name and physical address
- Nature of produce
 - “Shelling peas”, “Mange-tout peas”, “Sugar snap peas” or equivalent denomination if the contents are not visible from the outside
 - “Trimmed”, “Topped and tailed”, or equivalent denomination, where mange-tout peas and sugar snap peas are presented without the peduncle and/or the pistil, as the case may be if the contents are not visible from the outside.
- Origin of produce
- Country of origin and, optionally, district where grown, or national, regional or local place name.

3.5. SANITARY AND PHYTOSANITARY REQUIREMENTS OF THE MARKET(S) CONCERNED

Beans and peas in pods exported to the European Union must comply with European legislation on plant health. The European Union has laid down rules for the Trade in plants & plant products from non-EU countries to prevent the introduction and spread of organisms harmful to plants and plant products in Europe. These requirements are managed by the competent food safety authorities in the importing and exporting countries.

3.5.1. SANITARY REQUIREMENTS

Kenya is the second largest exporter of green beans to Europe, however, sustainable access to this market depends on complying to import requirement as stipulated in the European plant health law, Regulation (EU) 2016/2031 on protective measures against pests of plants, and Commission Regulation (EC) 2073/2005 on microbiological criteria for foodstuffs). Anyone who engages in production for the European market must therefore familiarize themselves and comply with the EU regulations. Border rejections (interceptions) of produce have huge negative impact on exporters, operators, and the entire sector.

THE PESTICIDES RESIDUES PROBLEM

To ensure that residues of plant protection products do not present unacceptable risks to human beings and, where appropriate, to animals, acceptable limits for these residues or MRLs have been set by regulations for each pesticide and each foodstuff. They have been set at the lowest reasonably achievable level compatible with 'Good Agricultural Practice', in order to protect the most vulnerable groups of consumers such as children and the unborn. It is prohibited to place on the market foodstuffs containing residues above established MRLs.

The risk associated with residues depends on the following three parameters:

1. the toxicity of the residue: acute and chronic toxicity, severity of the active substance's effects on the organism and possibly of certain of its metabolites or breakdown products;
2. contamination: concentration of residues found in food, including drinking water
3. exposure: which depends on consumption (quantity ingested and frequency of the residue in the diet).

To avoid health risks, the European Union (EU) set maximum residue levels (MRLs) for pesticides in and on food products. Products containing more pesticides residues than allowed (MRL) can be withdrawn from the European market. Maximum residue level (MRL) is the highest level of pesticide residue or a pesticide residue that is legally tolerated in or on food or feed

3.5.2. PHYTOSANITARY REQUIREMENTS

The International Plant Protection Convention (IPPC) stipulates the phytosanitary requirements that address plant health. The phytosanitary requirements are contained in the International Standards for Phytosanitary Measure N°1, ISPM 1 (Phytosanitary principles for the protection of plants and the application of phytosanitary measures in international trade). ISPM 1 aims to prevent the introduction and spread of agricultural pests through plants and plant products during trade involving countries. Fresh vegetables are subject to plant health inspections and require phytosanitary certificates prior to shipping. Fresh produce destined for the European niche markets must comply with the Commission Implementing Directive (EU) 2019/523 of 21 March 2019 amending Annexes I to V to Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community

Since the 14th of December 2019, a new EU Plant Health Law is being applied, repealing Council Directive 2000/29/EC. The aims of this new legislation are to provide a better protection of the EU territory against plant pests, as well as to ensure safe trade and mitigate the impacts of climate change on plant health.

These rules are contained in the Regulation (EU) 2016/2031. Several other delegated and implementing acts have also been adopted to ensure the implementation of this new legislation:

- i. List of regulated Quarantine Pests, protected zone Quarantine Pests and Regulated Non-Quarantine Pests (RNQPs); measures for plants, plant products and other objects.
- ii. List of high risk plants and plant products.
- iii. List of priority pests.

The Plant Health Law increases the prevention against the introduction of new pests via imports from third countries. Commission Implementing Regulation (EU) 2018/2019 establishes the list of high risk plants the introduction of which into the EU territory were provisionally prohibited from 14 December 2019 until a full risk assessment has been carried out. The rules concerning the procedure to be followed in order to carry out the risk assessment of high risk plants are detailed in Commission Implementing Regulation (EU) 2018/2018.

Phytosanitary certificates are provided by plant health authorities (NPP0) to guarantee that a product is:

- Properly inspected;
- Free from pests - free from quarantine pests; within the requirements for regulated non-quarantine pests and practically free from other pests;
- In line with phytosanitary requirements - laid down in Regulation (EU) 2019/2072 (establishing protective measures against pests of plants).

Management of pests is a key cross-cutting production challenge for the smallholder operators and it dictates the quality of the export produce. Phytosanitary measures entail any legislation, regulation, or official procedure aimed at preventing the introduction or spread of quarantine and regulated pests into the importing country.

3.6. MAIN PRODUCTION PROCESSES FOR BEANS AND PEAS IN PODS

The production process for beans and peas in pods in Kenya can be summarised as presented in figure 9 below.

Figure 9 — Flow Chart - Beans and Peas Value Chain



3.7. CHARACTERISTICS OF THE SITES, FACILITIES AND THE ENVIRONMENT

Operations at packhouses include cleaning, sorting, grading, trimming, weighing, packaging, and cooling of produce. For these operations, packhouse operators rely on hired labourers. Some of the workers are employed on a permanent basis, whilst others are temporary workers who are employed depending on the requirements. Packhouses have up to 50 workers in the case of a medium sized operator, and up to 300 in the case of a large-scale operator.

The freight stations for beans are mainly within and around Jomo Kenyatta International Airport, Nairobi. Freight companies are important in that especially smaller exporters do not have their own networks to handle the export of produce and freight arrangements. On the other hand, larger-scale exporters have their own cargo handling staff based at the airport. In this case Fresh beans are transported in dedicated cargo planes with no passengers on-board to Europe or other markets. Most of the known passenger airlines also have cargo subsidiaries which have branches at the airport. Importers in overseas markets include specialized companies (e.g. category managers) who focus on the import of fresh produce and take care of the cargo on arrival at the airport. They will handle the import formalities, re-pack the cargo or undertake processing if necessary before delivering it to the buyer, which are mostly large-scale retailers. The latter may have their own import subsidiaries through which they handle importation formalities and delivery of the produce to their distribution centres. The other option is that Kenyan exporters of fresh produce have importation branches in the UK or other overseas markets.

Within the European market, the two main markets for vegetables, and fresh green beans in particular, are the U.K. and French markets, with 53 percent and 24 percent respectively. The Netherlands is third, with seven percent.






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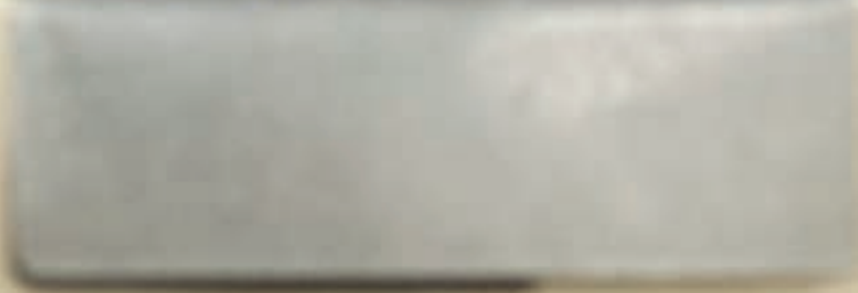
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A close-up photograph of a large pile of fresh green beans on a light-colored metal surface. The beans are vibrant green and appear to be freshly harvested. The background is slightly blurred, showing the texture of the metal and some shadows.

**DESCRIPTION
OF PROCESSES
AND ACTIVITIES,
HAZARD
ANALYSIS AND
RECOMMENDED
CONTROL
MEASURES**

REQUEST DATE	TEAM FLUENE	LINE	PRODUCT TRACE CODE	R
08/03	1A		R1 BEANS 184 9S/262898	T
08/03	1A		R1 BEANS 184 9S/262898	T
08/03	1A		R1 BEANS 184 9S/262898	T
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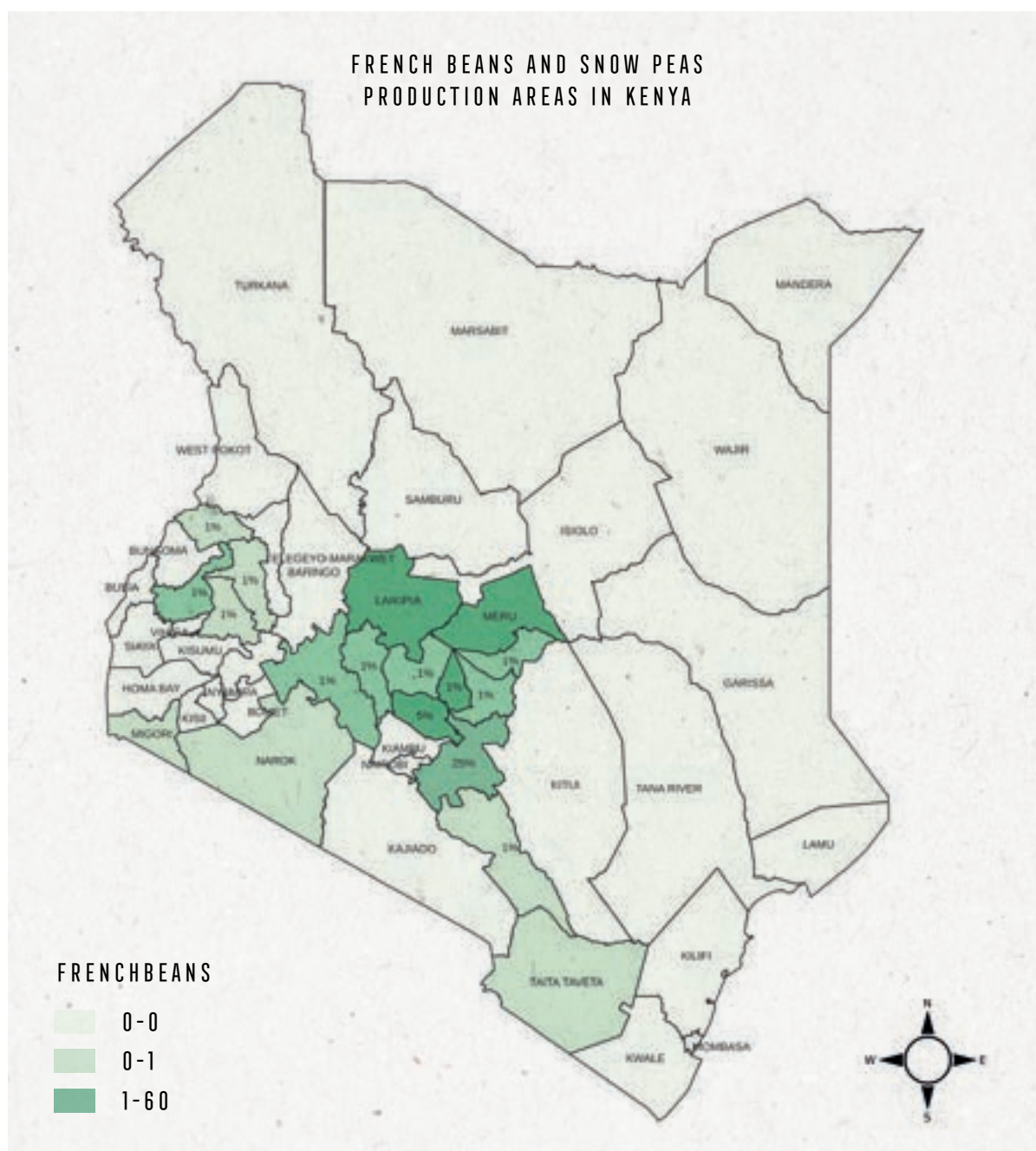
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BEANS AND
PEAS IN
PODS FIELD
ESTABLISHMENT
AND
MANAGEMENT

Beans and Peas in Pods Production in Kenya are produced all year round at higher altitudes and a minimum of 1500 m is advisable (Refer to figure 10). French beans are grown in the counties of Embu, Kakamega, Kirinyaga, Laikipia, Machakos, Makueni, Meru, Migori, Murang'a, Nakuru, Nandi, Narok, Nyandarua, Nyeri, Taita Taveta, Tharaka Nithi, Trans Nzoia and Uasin-Gishu. Major French bean production areas are: Kirinyaga with over 60%; Meru and Laikipia each with 10%; Muranga 5%; others include – Makueni and Machakos.

Snow peas are mainly grown in Laikipia, Meru, Murang'a, Nyandarua, Nyeri and Tharaka Nithi. Major production areas of snow peas are Meru with over 75% production in large scale farms owned by exporters.

Figure 10 — Map of Kenya showing major production areas for beans and peas with pods



1.1. SITE SELECTION

1.1.1. SITE HISTORY

Site selection should take into account both prior land use as well as current use of adjacent land. It is important to check on previous land use as well as current use of land and activities in the neighbouring area and assess the risk of cross-contamination. It may be necessary to create physical barriers to prevent cross-contamination (e.g. water diversion channels, wind erosion protection).

Hazards associated with prior land use include:

- i. *Land use for domestic animal production* could lead to contamination of produce by pathogens e.g. *E. coli* and salmonella found in the intestinal tract of animals. The magnitude of risk is related to the time that has passed since the land was last used for animal production. The risk of contamination also depends on site-specific conditions such as temperature, sunlight, precipitation, and relative humidity.
- ii. *Land use as a waste disposal site for garbage or industrial waste* which could lead to contamination of produce by toxic substances such as Chlorides, Sodium or boron, decomposing organic matter, faecal material, and pathogenic microorganisms. The risk of contamination depends on the time from last use and management of the site.
- iii. *Land use as a sanitary waste management site* would result in contamination of produce by pathogenic microorganisms. Depending on the time lag between former use and management of the site, the pathogen load can be extremely high.
- iv. *Land use for mining and oil/gas extraction* could have the risk of contamination of soil and produce by heavy metals and toxic hydrocarbons. Proper soil analysis is strongly recommended if ground history indicates high risk due to improper former site management.
- v. *Land use for agricultural activities could result in* contamination by residues due to former improper production practices such as organic and non-organic fertilizing (microbial loads or chemical residues) or improper use of agrochemicals, which can cause serious long-term chemical hazards.

Hazards arising from land use of adjacent sites can influence the present site by cross-contamination (e.g. water drainage, subterranean water flow and surface run-offs, pesticide drifts, eutrophication and effluent discharge into sources of irrigation water).

Hazardous contaminants can be deposited at the site by heavy flooding (e.g. toxic waste, faecal matter, dead animals). The risk of produce contamination at the production site can be influenced by activities in the neighbouring area. Contamination can reach produce through multiple means like water drainage and run-offs, subterranean water flow (water wells), wind erosion and transport by workers, animals, vehicles and equipment.

Every farm shall establish a farm map, which shows features such as the location of water sources, storage/handling facilities, ponds, stables, etc.; this should be cross-referenced to the identification system. A physical sign shall be used to identify each block.

1.1.2. SOIL ANALYSIS

The optimum soil pH is 6.5 to 7.5, but beans and peas in pods can tolerate a low pH of up to 4.5. Below a pH of 4.5, plant growth is impaired through limitation of development of the rhizobium bacteria that are responsible for the nitrogen fixation in the galls formed on the bean roots. The crop thrives in well drained soils which are rich in organic matter and with a slightly acidic to alkaline PH of 6.5-7.5. Due to this, it is recommended to have an understanding of the previous land use with regards to previous crops through a soil analysis for any new site before production can begin to ascertain whether the site is suitable for production or not.

1.2. LAND PREPARATION

The first ploughing should be done with a disc plough to effectively open and turn the soil.

Figure 11 — Land Preparation - Narok Country



- Check if there exists residue material from the previous crop and destroy
- Ensure shrubs and stumps are cleared from the land
- Plant fence/ barrier – vegetation
- Ensure thorough cleaning of hard ploughing and harrowing machinery as they may be a source of weeds seeds when not cleaned before commencement of the work.

1.3. SOWING OPERATIONS

It is advisable that operators check the nutrient & chemical status of the soil before sowing can begin.

Seed selection - Inspect seeds before planting to ensure they are not physically damaged, shrivelled (old seed stock). Ensure only certified seeds are used for planting. Ensure only certified seeds from authorised and registered sources are used for planting. Typically, seeds are already treated at the time of purchase (seed treatments with fungicide such as Thiram or biopesticide are used). It is recommended for operators to purchase pre-treated seeds, since operators may not correctly treat the non-treated seeds. It is recommended that operators purchase and use seeds already treated by the manufacturer. In Kenya, all imported seeds used must have a plant health certificate. Where the exporter supplies seeds, the seed lot number can be recorded in the Crop Records sheet with reference to the health certificate number. Seed treatments must be recorded in the Pesticide Application Records. Records of planting shall be kept in order to provide a history of crop. The details in the sowing record shall include the following: (Please refer to **Record Sheet No. 16**)

- Planting Date
- Farm code
- Block reference
- Area of the Block
- Crop Name
- Variety
- Planting Method
- Plant spacing
- Seed treatment
- Plant population
- Expected date of harvest

SOWING DEPTH

Seeds must be sown uniformly for uniform emergence and ripening. As the bean has epigeal germination (the cotyledons emerge above ground), easy emergence of the seedling must be ensured:

- in sandy soils: sowing depth between 3 and 5 cm,
- in heavy soils: 2 cm depth (no irrigation before emergence).

Anything that favours asphyxiation (heavy soils, too much water, compacted soil, and seeds sown too deep) will compromise emergence; emergence will be irregular and seedlings will be susceptible to root and collar diseases.

SOWING DATES

Beans can be sown and harvested all year round in Kenya. In other countries, beans sown in ground that has warmed up germinate faster and emerge more uniformly. This advantage continues right to harvest, with pods ripening more uniformly. Numerous other factors that must be taken into account in planning sowing dates, e.g. shipping capacity and duration of crop cycle (8 to 10 weeks for French beans).

1.3.1. PLANT SPACING

Beans and peas in pods are planted at different spacing depending on variety and mode of irrigation as farmer is going to use.

Recommended sowing pattern according to irrigation is listed below:

- **Furrow irrigation:** Seed rows are positioned on the shoulders of the furrow at the expected water line when the furrow is flooded. Seeds are spaced at 4 - 8 cm apart within the row, depending on variety, season and soil type. Rows of seeds are usually 1 ft. apart (width of furrow). The ridges of furrows are usually 2.5 ft. apart.
- **Drip irrigation:** Beans are planted on a raised bed in a range of patterns - either two rows, three rows or four rows of seeds per bed. The more rows per bed, the wider the beds.

Two-row beds are one-meter-wide (bed centre to adjacent bed centre); three-row beds are 1.5 to 1.8 m wide and a four row bed would be 2 - 2.2m wide.

Aim to have about 40 cm between rows and plant seeds in a zig zag pattern between the rows - to increase airflow in dense plantings. Avoid higher density plantings in the rainy season or for varieties, which are prone to rust.

Plant one seed every 7 - 8 cm along the rows. Increase the spacing in rainy periods.

1.3.2. PLANT STAKING

Peas require support and these must be in place as soon as the crop is 20 cm high. Delays in providing plant supports will result in loss of yield and quality due to disease. A series of posts, about 20 meters apart in the row, are positioned to support double strands of strings at 20 cm intervals. The first set of strings will be 10 cm above the ground and the other sets of strings about 20 cm apart. End posts, which secure the top wire (high tensile 12.5 gauge) should be buried at least 45 cm into the ground.

Figure 12 — Peas field with support (picture credit - Authors)



1.4. WEEDING

- Timely and thorough weeding is absolutely essential. The first weeding should be done 2 – 3 weeks after emergence followed by a second weeding 2 – 3 weeks later. Care should be taken to avoid damaging the shallow roots, especially during the first weeding, or when the crop when it is at flowering time or when the field is wet, to avoid flower shedding, the spread of diseases, and soil compaction. Ensure initial weeding is done by hand using simple tools with minimal disturbance on the soil
- Take care not to damage shallow roots especially during the first weeding

1.5. FERTILIZER AND ORGANIC MANURE APPLICATION

This shall take into account the results of the soil analysis, crop demands, timing of application (stage of growth) and recommendations made for the specific site.

Fertilizer applications must be planned with precision so that the dosage of each nutrient is appropriate to actual conditions in each field (this requires a soil analysis every 3 years). Records should be kept of any soil analysis undertaken which justifies fertilizer applications in order to comply with commercial requirements.

At planting, apply 100Kg of DAP per acre and thoroughly mix it with the soil before planting. This should however be based on the results of a soil analysis. DAP is preferred because it contains considerably higher levels of phosphorus which helps the crop with root development. Other phosphatic fertilizers like TSP can be used.

For topdressing, apply 50kg CAN per acre at the first 3-leaf stage, and 50kg per acre when the crop begins to flower. CAN fixes nitrogen in the soil which increases the green color of the leaves, responsible to make food for the plant. Other nitrogenous fertilizers like urea can also be used. Other crop nitrogen sources like foliar feeds and other methods of fertigation are also appropriate and should be applied based on technical inputs of the Farm Agronomist.

PEAS

Applications of DAP fertilizer at a rate of 100 kg per acre at sowing time and again after one month is recommended for root growth. At flowering stage, the plants should be dressed with CAN at a rate of 80kg per acre. All fertilizer applied should be mixed well with soil. Avoid excess nitrogen which will promote vegetative growth at the expense of growth of pods and it also increases the susceptibility of plants to diseases.

Records of application should be kept and reference the location of application based on the field identification systems already established and will include date of application, trade name, type of fertiliser and concentrations, amount applied, the equipment used and the name of the operator. No treated or untreated human sewage sludge shall be used for production. Advice on fertilizer applications on the

crop will be based on recommendations following soil analysis and crop condition. It is important to consider the origin and quality of fertilizers as some of them contain heavy metals. These chemical contaminants can generate risk for beans and peas. All fertilizer applications shall be approved by a competent person and recorded.

The records will contain the following details (Please refer to **Record Sheet No. 11**):

- Application location e.g. block
- Application dates (the exact dates)
- Applied fertilizer types e.g. N.P.K and concentrates 17:17:17
- Applied quantities in weight (kg/gm) or volume (litre/ml)
- Method of application (basal, top dressing, foliar application, fertigation)
- Operator details

Inventory of the stored fertilizers should be maintained up to date.

The fertiliser store should meet the following minimum requirements:

- Clean
- Dry
- Properly roofed to avoid rainfall leaks and direct sunlight
- Not used for storing pesticides and propagation materials
- Banded to prevent environmental contamination resulting from spillage
- Separated from harvested products
- Separated from seeds and plant protection products
- Liquid fertilizers shall be stored in a manner which ensures no spill out to the solid fertilizers.
- Well ventilated

ORGANIC MANURE

Organic manure must be well decomposed and dry. The recommended dosage is: 4 to 8t/acre if possible. Unlike peas, beans respond well to farmyard manure: 10 to 12 T/acre of well-rotted manure (of at least 6 months) at the time of sowing can be beneficial if the soil's organic content is too low. The aim is to have up to 5% organic matter content

Where organic fertiliser is used, a risk assessment should be carried out to determine the risk of the organic fertilizer with respect to chemical, heavy metals, and microbial contamination.

1.6. USE OF PLANT PROTECTION PRODUCTS (PPPS)

1.6.1. INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM) measures for prevention, observation and monitoring, and intervention should form the basis of a production entity's pest and disease management program.

Prevention measures to reduce the incidence and intensity of pest attacks, and thereby reducing the need for intervention include selection of optimal or resistant varieties (pest and disease free seeds, crop rotation, year of rest/fallow periods, soil treatments such as fumigation and solarisation, field hygiene (removal of crop residues) choice of varieties that are resistant to diseases, optimal plant density, timing of planting, clean working tools, restricted movement of personnel from infected fields. Other methods of prevention include choosing an optional planting date to reduce the problems with key pests and diseases.

During the cropping season, it is important for operators to prevent transmission of pests and diseases by people e.g. workers and or visitors' movement from a diseased crop to a healthy crop. This can be through wearing suitable protective clothing as well as disinfecting before entry into the field using e.g. footbaths. Transmission can also occur from infected tools and equipment and these should also be cleaned after working and before entering a new field.

Cover crops can be used to prevent weeds and stimulate natural enemies. Fallow field margins can also prevent immigration of pests.

Observation and monitoring, commonly referred to as scouting, requires the operator to systematically inspect the crop and its surroundings for the presence, stage (eggs, larvae etc.) and intensity (population level; infestation level) of development, and location of pests, diseases and weeds. This allows the grower to be alert on the presence and level of pests, diseases and weeds in his crop and to make a decision on the most appropriate intervention. Weekly monitoring through pest scouting with the help of monitoring devices like pheromone traps, coloured sticky traps should be practiced.

Scouting provides a formalized system for assessing the incidence of pests and diseases within the growing crop. Scouting should include assessment for both the presence of pests and diseases, and that of beneficial insects. Results of the scouting shall be used to inform the mode of intervention.

1.6.2. PEST SCOUTING

A scouting program should:

Identify the pests and diseases to be monitored and how they should be monitored (monitoring frequency, monitoring unit, amount of sampling points) and when they should be monitored. Whether using pesticide applications or an integrated crop management approach, it is important to understand the crop environment. Scouting provides a formalized system for assessing the incidence of pests and diseases within


the growing crop. Scouting should include assessment for both the presence of pests and diseases, and that of beneficial insects. Results of the scouting shall be used to inform the mode of intervention. The justification for the method shall be recorded.




Recommendations to apply plant protection products on the crop will thus be based on knowledge of the crop, the scouting results, prevailing or anticipated weather conditions and Integrated Crop Management. The intervention involves both non-chemical and chemical methods. The non-chemical methods include;



- Physical/ mechanical - removal of diseased or pest infested plants, hand removal or mechanical removal of weeds
- Use of baits/traps - trap crops, repellants, release of natural enemies


Table 8 below gives a profile of pests and diseases for beans and peas in pods and the recommended management/control measures.




Table 8 — Main Pests and Diseases


PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Aphids (<i>Aphis fabae</i>)</p> 	<p>Aphids cause direct damage to bean plants during the vegetative and flowering phases. Aphid colonies can attack young shoots, the underside of leaves, petioles, and seedlings</p>	<ul style="list-style-type: none"> • Check plants for presence of aphids • Management by use of yellow stick traps • Look for tolerant varieties if available • Use of reflective mulches such as silver colored plastic can deter aphids from feeding on plants. • Sturdy plants can be sprayed with a strong jet of water to knock aphids from leaves • Insecticides are generally used only when the infestation is very high. Usually plants generally tolerate low and medium level infestation • Insecticidal soaps or oils such as neem or canola oil are usually the best method of control. Use synthetic and biopesticides recommended by PCPB



PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Whiteflies (<i>Bemisia tabaci</i> and <i>Trialeurodes vaporariorum</i>) Swahili: Inzi Weupe</p> 	<p>Direct feeding damage from whitefly adults and nymphs causes chlorotic leaf spots, which can be seen on the upper surface of leaves. Depending on the extent of whitefly colonization, these spots can merge until the entire leaf is yellow. When whiteflies are not controlled, and their feeding is excessive, leaves can become brittle and eventually dry up and fall off.</p>	<ul style="list-style-type: none"> • Monitor and check plants for signs of white flies' damage • Remove all alternative hosts, including weeds • When population build up, spray using PCPB recommended pesticides
<p>Leaf miners (<i>Liriomyza</i> spp.)</p> 	<p>Feeding damage caused by leaf miner appears as tunneling (0.13-0.15 mm diameter) on the upper side of leaves. The shapes of these tunnels vary according to the attacked plant, but they are long, linear, and not very wide when sufficient leaf area is available. They are generally greenish to white.</p>	<ul style="list-style-type: none"> • Monitor and check plants for signs of leaf miner damage at least twice per week • Use blue sticky traps • Remove plants from the field immediately after harvest • Remove all alternative hosts, including weeds • Use synthetic and biopesticides recommended by PCPB
<p>Legume pod borer (<i>Maruca testulalis</i>)</p> 	<p>The damage caused by this pest includes round boreholes in the corolla, which can turn the flowers into a brownish mass within 24 hrs.</p>	<ul style="list-style-type: none"> • Monitor regularly the crop to detect eggs and young caterpillars before they enter the pods • Apply biopesticides such as Bt or neem products. They usually give good control of pod borers, provided they are applied to pods before the young caterpillars enter into the pods. Once the caterpillars have entered the pods they are difficult to control and by then they have caused damage. • Use Synthetic pesticides recommended by PCPB




PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Foliage beetles (<i>Ootheca spp.</i>; <i>Monolepta spp.</i>)</p>  <p>© A.M. Varela, ICIPE</p>	<p>Commonly found feeding on bean leaves. Foliage beetles chew small round holes in the leaves. They are about 4-7mm long. They may be a serious problem when present in large numbers or when attacking young plants. Heavy attacks may cause defoliation. Attack on young plants may reduce plant vigour, plant size and yield. The problem is more acute in fields with continuous growing of beans. <i>Ootheca</i> beetles are normally not serious pest of French beans, but are an important pest of common beans in East Africa. The larvae (grubs) of foliage beetles live in the soil feeding on roots. Their feeding may cause stunted growth and premature ageing of the plants. Grubs of weevils live in the soil feeding on roots or may bore into the stem of the bean plant causing swellings or galls, as is the case of the striped bean weevil. Plants attacked by grubs of this weevil show stunted growth and may die. The stem of the plant breaks easily during harvesting.</p>	<ul style="list-style-type: none"> • Beetles populations can be reduced by handpicking larvae and adults • Brush eggs from leaves and destroy by applying insecticidal soap the underside of leaves • Use Synthetic and bio pesticides recommended by PCPB
<p>Red spider mite (<i>Tetranychus telarius</i>)</p>  <p>© A.M. Varela, ICIPE</p>	<p>Spider mites feeding on bean plants may cause reduction in plant growth, flowering, number and length of pods, and number of seeds per pod. Damage is most severe when mites attack young plants. Mite damage may be particularly severe during the dry season. Yellow spots are noted on the upper side of leaves, while small mobile mites (0.5 mm) are found on the lower side. A very fine web may be noted when these mites occur in high numbers</p>	<p>Pest Scouting Overhead irrigation reduces population build-up Apply insecticidal soap or oil Use synthetic and bio-pesticides recommended by PCPB</p>




PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p data-bbox="199 309 512 383">Army worm (<i>Spodoptera frugiperda</i>)</p> 	<p data-bbox="587 309 975 622">Young larvae feed on the superficial layer of leaves, often leaving the epidermis and large veins intact. Later instar larvae pierce irregular holes in the leaves and fully developed larvae can consume all of the leaves, leaving only the main leaf ribs</p>	<ul data-bbox="1002 309 1378 1554" style="list-style-type: none"> • Prepare land early during hot months. Sun ray will reduce the soil borne inoculums of pest and disease • Add manure/compost to your field and fertilize your crops to maintain high soil fertility to make your crops grow well to compensate for any loss. Strong plants are also able to resist or withstand infestation of pests and diseases • Early planting • Intercropping and crop rotation • Practice field sanitation through weeding and removing infested crop residues • Habitat management using a push-pull strategy • Biological control through the use of natural enemies such as parasitoids (small wasps), predators (ants, viruses, bacteria etc.) • Mechanical control by searching and crushing of the different life stages of army worm one week after planting • Use pest control products approved by PCBP as the last option

PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Bean Flower Thrips <i>(Megalurothrips usitatus)</i></p>  <p>Source: Ko Ko Maung, Bugwood.org</p> 	<p>Feeding by flower thrips causes scars and blemishes on leaves and pods. Flower thrips can be found feeding on young plants. They are less than 2 mm long. As soon as the plants start flowering, however, most thrips would be found in the flower buds, flowers and on the young pods. Heavy thrips feeding causes flower abortion and flower malformation. French bean pods become scarred (having a rough silvery surface) and malformed.</p>	<ul style="list-style-type: none"> • Pest scouting at least twice per week • Observe thrips on flowers • Strike flowers on a white paper • Two thrips per flower will warrant management • Management by use of yellow stick traps • Application of effective pest control products recommended by PCPB <p>Source: (Inventory of Climate Smart Agriculture Garden Pea Technologies, Innovations & Management Practices-KALRO/ KSCAP)</p>
<p>Looper caterpillar <i>(Trichoplusia ni)</i></p> 	<p>The appearance of large irregular holes on the surface of leaves is a sign of looper caterpillar feeding</p>	<p>Monitor the crop regularly to detect eggs and young caterpillars before they enter the pods</p> <ul style="list-style-type: none"> • Apply biopesticides such as Bt or neem products. They usually give good control of pod borers, provided they are applied to pods before the young caterpillars enter into the pods. Once the caterpillars have entered the pods they are difficult to control and by then they have caused damage • Use synthetic pesticides recommended by PCPB



PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Bean flies (<i>Ophiomyia spp.</i>)</p> 	<p>Bean flies also called bean stem maggots are serious pests in Africa. The adult is a tiny (about 2mm long) fly, shiny black-bluish in colour. The female fly pierces the young leaves to lay eggs and sucks the exuding sap. This leaves yellow blotches on the leaves, which are the first signs of bean fly attack and may serve as early symptom useful for monitoring the presence of this pest in the field. Maggots mine their way from the leaves down to the base of the stem, where they complete their development. Attacked plants produce adventitious roots in compensation. Maggots (yellow in colour) and pupae (brown or black in colour) can often be seen through the stem splits. Young seedlings and plants under stress wilt and die when attacked by bean flies. Older or vigorous plants may tolerate bean fly attack, but their growth will be stunted and their yield reduced. Damage is more severe in plants growing under poor conditions such as infertile soils and drought.</p>	<ul style="list-style-type: none"> • Pest Scouting • Apply insecticidal soap or oil • Use synthetic and bio-pesticides recommended by PCPB

PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Bean seed fly (<i>Delia platura</i>)</p> 	<p>The bean seed fly, also known as seed corn maggot, resembles small houseflies. It is about 1cm long.</p> <p>Female flies are attracted to recently disturbed open soil, where they lay eggs, especially where there are plant residues or when large amount of manure has been applied. The maggots bore into germinating bean seeds or the cotyledons (first seed leaves) of the young plant eating them. This causes patchy emergence of seedlings. If damaged plants emerge, they are stunted, weak and fail to develop into productive plants.</p>	<ul style="list-style-type: none"> • Pest Scouting • Apply insecticidal soap or oil • Use synthetic and bio-pesticides recommended by PCPB • Do seed treatment before planting
<p>Root-knot nematodes (<i>Meloidogyne spp.</i>)</p>  <p>Source: Pea Diseases - Vikaspedia</p>	<p>The larvae penetrate the roots and settle in the vascular area, inducing swellings or galls. The shape, size, and appearance of the galls vary with their age, number, the host plant, extent of the attack, and environmental conditions. Under heavy infestations, the roots can become swelled and stunted.</p> <p>Migratory endoparasitic nematode: Attacked plants show halted growth, reduced vigor, wilt, leaf necrosis and chlorosis, defoliation, brown, reddish or blackish root rot, and a reduction in yield.</p>	<p>Control of root knot nematodes through IPM practices;</p> <ul style="list-style-type: none"> • Resistant varieties • Crop rotation or fallow (long enough) • Scouting • Soil solarization • Biocontrol agents

PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Leaf spot or leaf blight</p> 	<p>Symptoms are easily identified in the field and generally only occur on the primary leaves, appearing as round brown spots surrounded with a darker ring, or many small regular black spots, depending on the pathogen. Under high humidity conditions, these symptoms can occur in older trifoliolate leaves or ripening pods.</p>	<p>Keep crop Leaf and pod spots free by applying integrated pest management practices (IPM) such as:</p> <ul style="list-style-type: none"> • Resistant varieties • Crop rotation • Clean seeds • Seeds treatment with an appropriate fungicide or biocontrol prior to planting • Proper use of fungicide
<p>Bacterial blight of beans</p> 	<p>It may attack the entire plant leaves, buds, and seeds. After entry through the leaves, the bacteria multiply at an exponential rate within the intracellular spaces</p>	<p>Keep crop Leaf and pod spots free by applying integrated pest management practices (IPM) such as:</p> <ul style="list-style-type: none"> • Resistant varieties • Crop rotation • Clean seeds • Seeds treatment with an appropriate fungicide or biocontrol prior to planting • Proper use of fungicide
<p>Anthracnose of beans (<i>Colletotrichum lindemuthianum</i>)</p> 	<p>Symptoms can also be noted on all the above-ground plant parts. It induces brown lesions, first on the underside of leaf veins. The disease then spreads laterally as lenticular pale brown spots with darker brown borders that are visible on the upper surface of the leaves.</p>	<ul style="list-style-type: none"> • Use certified planting material • Plough down crop residues • Practice crop rotation • Seed treatment with insecticide and fungicide • Spray with fungicides recommended by PCPB

PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Collar rot/ collar necrosis/ pod rot/ southern blight (<i>Sclerotium rolfsii</i> Sacc.)</p> 	<p>At a quite early stage, symptoms appear as yellowing of the edges of the lowest leaves along with wet rot at the base of the collar just above the soil line. The top leaves then begin yellowing and fall. The pathogen spreads to the stem and roots and destroys the cortex. It sometimes also attacks the vascular tissues and develops in the upper branches and the tissues darken</p>	<p>Apply integrated pest management practices (IPM) such as:</p> <ul style="list-style-type: none"> • Resistant varieties • Crop rotation • Clean seeds • Proper use of fungicide as recommended by PCPB
<p>Angular leaf spot disease Fungus (<i>Phaeoisariopsis griseola</i>)</p> 	<p>This disease develops on the lower leaves of the plant as angular spots that are initially grey, then brown and limited by the leaf veins. The lesions can also be surrounded by a chlorotic halo with no coloured border.</p>	<ul style="list-style-type: none"> • Use certified planting material • Plough down crop residues • Practice crop rotation • Seed treatment with fungicide • Spray with fungicides
<p>Ashy stem blight or stem rot of bean (<i>Macrophomina phaseolina</i>)</p> 	<p>The entire plant, including the leaves, buds, roots, and seeds—but mainly the stems and roots—can be attacked by this fungus. Dry rot symptoms appear on the cotyledons as blackening of growing points and the collar. Small black spots develop in the infected area</p>	<ul style="list-style-type: none"> • Control foot, root and stem rot in bean peas on pods by applying integrated pest management practices (IPM) such as: • Resistant varieties • Crop rotation • Clean seeds • Proper use of fungicide

Source:
pgro.org/pests-diseasea-peas

PESTS	SYMPTOMS/DAMAGE AND STAGE OF SENSITIVITY	MONITORING/MANAGEMENT
<p>Fusarium root rot of beans (<i>Fusarium solani</i> f.sp. <i>phaseoli</i>)</p> 	<p>Longitudinal reddish lesions appear at the base of the stem and the roots become necrotic and the taproot turns reddish</p>	<ul style="list-style-type: none"> • Crop rotation is important since the fungi is soil borne • Sanitation in the fields- remove and burn diseased crop residues • Plant crop on well drained soil • Use certified seeds • Spray with fungicides recommended by PCPB
<p>Damping-off, blackleg (<i>Pythium aphanidermatum</i>)</p> 	<p>When plants are infected by these diseases, emergency after sowing is hampered and the seedlings that manage to emerge have black rotting roots. The plants suddenly wilt and soft and wet rot are noted on the roots, collar and sometimes the stems</p>	<ul style="list-style-type: none"> • Plough down crop residues from diseased plants after harvest • Seed treatment with fungicide • Crop rotation • Weed control

The control of pests and diseases doesn't necessarily have to be done through use of pesticides as indicated in table 8 above, cultural methods as can be seen from the table 9 below, are just as effective but more environmentally sustainable than the use of pesticides.

Table 9 — Methods for control of pests and diseases in French Beans

CROP PROTECTION PRINCIPLE	SPIDER MITE	APHIDS	THRIPS	WHITE FLY	BEAN & SEED FLY	ROOT NOTE NEMATODE	RUST	ROOT DISEASE
CHOICE OF LAND AND PREPARATION OF SOIL								
Rotation								
Soil cultivation (e.g. deep ploughing post-harvest etc.)								
Avoid planting near susceptible plants or infested crops								
Avoid land which is badly drained								
Avoid shade								
CULTIVATION METHODS								
Adapt irrigation methods (e.g. use drip irrigation or overhead)								
Use protective covers - plastic tunnels etc								
Adapt planting density								
CULTURAL CONTROLS								
Use straw mulches								
Organic manure applications								
Regular weed control								
Avoid wet foliage for long periods								
Use trap plants or green manures								
CARE AND ATTENTION OF PLANTS								
Use straw mulches								
Organic manure applications								
Regular weed control								
Avoid wet foliage for long periods								
Use trap plants or green manures								
CARE AND ATTENTION OF PLANTS								
Remove and destroy crop debris								
Do not damage plants in normal husbandry								
Remove infected parts of plants manually								
CROP PROTECTION METHODS								
Biological control								

Source: Crop Protection Protocol, French beans (*Phaseolus vulgaris*); a COLEACP Publication

1.6.3. PROPER APPLICATION OF PESTICIDES

Where intervention requires the use of chemical plant protection products (PPP) - these must be selected in advance and should take into account chemicals registered for use for beans and peas in the country of production as can be seen in table 10 below.

Table 10 — Recommended Plant protection products and their dosages - Insecticides, miticides and nematicides

RESIDUES	EU REGULATION	MRL (MG/KG)-AS AT THE YEAR 2022		GAP WITH PHI (DAYS)			
	STATUS REGULATION 1107/2009	EU MRL	CODEX MRL	DOSE G/HA	MAXIMUM NO. OF APPLICATIONS	INTERVAL BTW APPLICATIONS (DAYS)	PHI DAYS
Abamectin (sum of avermectin B1a, avermectin B1b and delta-8,9 isomer of avermectin B1a, expressed as avermectin B1a)	Approved	Beans with pods: 0.03 Beans without pods: 0.01 Peas: 0.01	0.08	13.5	3	7	7
Acephate	Not approved	0.01	5	800	21	14	Not for use on vegetables
Acetamiprid	Approved	0.6	0.4	40	2	14	7
Alpha-cypermethrin	Approved	0.7	-	15	3	7	21
Azadirachtin	Approved	1.0	-	6	2	7	-
Bifenthrin	Not approved	0.01*	-	37.5	3	7	3
Buprofezine	Approved	0.01*	-	400	2	4	7
Carbofuran	Not approved	0.01*	-	2500	1	/	/
Chlorpyrifos-methyl	Approved	0.01*	-				
Cyromazine	Approved	5.0	-	225	3	7	3
Deltamethrin	Approved	0.2	-	20	3	7	1
Dicofol	Not approved	0.02*	1				

RESIDUES	EU REGULATION	MRL (MG/KG)-AS AT THE YEAR 2022		GAP WITH PHI (DAYS)			
	STATUS REGULATION 1107/2009	EU MRL	CODEX MRL	DOSE G/HA	MAXIMUM NO. OF APPLICATIONS	INTERVAL BTW APPLICATIONS (DAYS)	PHI DAYS
Dimethoate	Approved	0.01*	-	800	2	14	
Fenbutatin oxyde	Approved	0.01*	-				
Hexythiazox	Approved	0.5	-	50	2	14	7
Imidacloprid	Approved	5.0	2	202	3	7	3
Indoxacarbe	Approved	0.5	-	37.5	4	7	7
L-Cyhalothrine	Approved	0.4	1	15	4	7	7
Lufenuron	Approved	0.01*	/	40	3	7	3
Malathion	Approved	0.02*	1				7
Methomyl	Approved	0.1	1	500	3	7	
Methoxyfenozie	Approved	2.0	-	120	2	14	7
Sulfur	Approved	1	-	320	3	7	1
Thiamethoxam	Approved	0.3	-	50	3	14	7

Key: (*) Indicates lower limit of analytical determination

Table 11 — Recommended Plant Protection products - Fungicides and Bactericides

RESIDUES	EU REGULATIONS	PHI (DAYS)		GAP WITH PHI DAYS			
	STATUS REGULATION 1107/2009	EU MRL	CODEX MRL	DOSAGE G/HA	NO. OF APPLICATIONS	INTERVAL BTW APPLICATIONS (DAYS)	PHI DAYS
Azoxystrobin	Approved	3.0	-	125	3	7	14
Captan	Approved	0.03*	-	2400	3	7	
Chlorothalonil	Approved	0.8	-	1440	3	7	7
Copper	Approved	20	-	1000	3	7	3
Cyproconazole	Approved	0.05*	-	30	3	7	42
Difenoconazole	Approved	1.0	-	125	4	14	7
Myclobutanil	Approved	0.8	0.8	100	2	7	
Pencycuron	Approved	0.02*	-	Seed treatment	1	n.a	
Tebuconazole	Approved	2.0	-	187.5	3	7	7
Tetraconazole	Approved	0.02*	-	40	2	14	
Thiophanatemethyl	Approved	0.1*	-	500	1	14	14
Trifloxystrobin	Approved	1.0	-	250	2	7	14
Vinchlozolin	Not Approved	0.1*	-				

Source:

https://www.fao.org/fao-who-codexalimentarius/codex-texts/dbs/pestres/commodities-detail/en/?c_id=332

<https://www.pcpb.go.ke/crops/>

<https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/mrls/?event=search.pr>

Key: (*) Indicates lower limit of analytical determination

Since there are often several trade names for the same active substance and because registrations change regularly, operators have to check those which are valid in their country at the time of using crop protection products, in this case, by consulting the PCPB website for Kenya: <https://www.pcpb.go.ke/>. It is good practice to compare this with what is available on the European Union Pesticides Database available on <https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/mrls/?event=search.pr>

1.7. IRRIGATION

Irrigation should take into account crop requirements. Operators should predict crop irrigation requirements based on the prevailing weather conditions, the crop cycle (crop needs), soil type and water availability.

WATER REQUIREMENT

- Between 3,000 and 8,000 m³ per ha of actual crop area.
- On sandy soils, irrigation should be more frequent than on heavier soils.

WATERING REGULARITY

- From the moment of emergence, the plant must never be subjected to water stress. The emergence and flowering/pod formation stages are particularly sensitive.

FREQUENCY OF IRRIGATION

- To encourage the establishment of the root system, do not water too often until the crop has begun to root in order to encourage deeper rooting.
- To avoid root collar diseases, irrigation should be prudent and not excessive before emergence, in sandy soil.

TIMING OF IRRIGATION

- From the moment of emergence, the plant must not be subjected to water stress. The emergence and flowering/pod formation stages are particularly sensitive. To encourage the establishment of the root system, watering frequency should be taken into consideration until the crop has formed roots (to encourage deeper rooting). To avoid root rot diseases (e.g. *Pythium*), irrigation should be prudent and not excessive before emergence.
- With spray or row irrigation, water in the morning to reduce the risk of prolonged high relative humidity on leaves and root collar (risk of rust, *Rhizoctonia*, *Sclerotinium*, *Sclerotium*, anthracnose, blight and *Pythium*), and avoid water stress in very hot weather.
- With sprinkle irrigation, do not irrigate after applying a foliar treatment.

IRRIGATION METHODS

There are generally 3 types of irrigation methods:

- surface irrigation - flood, basin, border or furrow irrigation
- sprinkler irrigation - micro-sprinklers, central pivot irrigation systems, laterals, gun and boom systems
- drip irrigation.

Where overhead irrigation is used, watering in the morning reduces the risk of prolonged high relative humidity on leaves and root collar, and avoid water stress in very hot weather. With sprinkle irrigation, irrigation should not be done after application of treatment.

QUALITY OF WATER FOR IRRIGATION

It is important to ascertain irrigation water quality through testing as well as regular monitoring to ensure that the water does not become a source of contamination. A risk assessment for quality of water used for irrigation and other pre-harvest activities shall be done. The risk assessment should take into account potential microbial, chemical, or physical pollution of irrigation water. The risk assessment should also consider the irrigation method and the crop, historical water testing results, frequency of analysis, sources of water, method of irrigation, timing of water application, water contact with the crop, characteristics of the crop and growth stage, susceptibility for pollutants and drain water and the environment. Generally, growers should avoid saline water, which will cause an immediate drop in yield as well as avoid irrigating directly with chlorinated water.

The water should be analysed in an ISO 17025 accredited laboratory for the following:

- Microbial contamination
- Chemical pollutants
- Heavy metal pollutants

In case of a borehole, check if extraction permit for water source are from relevant authorities.

Water contamination can occur at any point from source to application and can affect the crop either in the field or during handling.

MICROBIAL CONTAMINATION

Rivers and water reservoirs are more susceptible to contamination than wells. Contamination by human - where sanitation facilities provided for farm workers are lacking, insufficient or located near water source thus risk of contamination. It could also occur as a result of animal faecal matter - in farms where there is mixed production and inadequate provision for zoning to prevent contamination of water sources. Contamination can also occur where the composting site or manure is located near water source or water channel. Thus water channels must be separated from

sanitary facilities. Domestic animals should be off water sources and in the crop production area. Effective and robust fencing should be done to ensure separation; grazing animals upstream should also be avoided.

CHEMICAL POLLUTANTS

Chemical contamination of water can occur from runoff of agricultural activities upstream or within the farm if buffer zones to prevent pollution of water sources are not protected. In production zones close to the urban areas there is risk of heavy metal contamination as a result of water pollution from industries. Table 7 below shows standards for irrigation water as per the legal notice No. 120, Environmental Management and Co-Ordination (Water Quality) Regulations, 2006.

Table 7 — Standards for irrigation water (Ninth Schedule)

PARAMETER	PERMISSIBLE LEVEL
pH	6.5-8.5
Aluminium	5 (mg/L)
Arsenic	0.1 (mg/L)
Boron	0.1 (mg/L)
Cadmium	0.5 (mg/L)
Chloride	0.01 (mg/L)
Chromium	1.5 (mg/L)
Cobalt	0.1 (mg/L)
Copper	0.05 (mg/L)
<i>E. coli</i>	Nil/100 ml
Fluoride	1.0 (mg/L)
Iron	1 (mg/L)
Lead	5 (mg/L)
Selenium	0.19 (mg/L)
Sodium Absorption Ratio (SAR)	6 (mg/L)
Total Dissolved Solids	1200 (mg/L)
Zinc	2 (mg/L)

Standards for Irrigation Water – Kenya Source: LEGAL Notice No. 120 Environmental Management and Co-Ordination (Water Quality) Regulations, 2006

1.8. HARVESTING

1.8.1. PRE-HARVEST INTERVAL

All harvesting shall be coordinated by the Technical Advisor. Pre-harvest intervals (PHI, in days) shall be observed for all the fields sprayed with pesticides. To ensure a safe compliance system of PHI observance, all the sprayed fields shall be marked with a yellow flag until the harvest interval is clear and the field is ready for harvesting. The PHI for each spray application as well as clear date to harvest the block shall be recorded.

The operator should conduct a pre harvest check in order to compare the LAST SPRAYING DATES and the PHI required to be sure that the block can be harvested.

Harvesting details shall be recorded (**Refer to Record Sheet No. 19**). The harvesting records shall indicate the following details:

- Farm name
- Block harvested
- Crop variety
- Date of harvest
- Quantity of product harvested

1.8.2. HARVESTING OPERATIONS

Picking of pods begins six to eight weeks after planting, depending on the area and variety, and continues for about one to two months. Harvesting is done manually with the pod stalk. Preliminary sorting in the field is done to reject pods that are perforated, damaged, marked, twisted, etc. It is advisable during picking that the operator;

- Picks and handles beans with great care.
- Lay beans in a rigid but aerated container and do not pile more than 20 cm deep.
- Regularly brings harvested beans and peas to a shaded area (ideally every 10 minutes)
- Bring harvest to the packing center as quickly as possible (every 30-45 minutes).
- Maintains product traceability throughout all operations from picking to processing and to the final destination.

During hotter periods, the crop will grow faster, and picking may have to be done more frequently to avoid losses due to growth over-specification. After harvesting crop residues should be removed from the field and disposed-off appropriately.

Harvested produce shall be transported by the operator to the main group produce collection shed, where it will be collected by the export company truck on the same date of harvest.

Below is a list of the activities to be performed at the produce collection shed;

- Receiving product in crates delivered by operators
- Labelling of crates with traceability stickers where applicable
- Produce sorting and quality inspection
- Weighing of produce
- Cleaning of the facility and harvest buckets

Workers shall be trained and supervised closely to ensure that the produce is harvested using the correct method and at the correct maturity. Smoking, eating, chewing and drinking should not be permitted in the cropped area and must be restricted to designated areas away from immediate vicinity of harvesting, grading, packing, or storage operations. Animals and children shall be excluded from all produce handling areas.

The containers, harvesting tools and other harvesting equipment that are continuously used shall be appropriately cleaned, and disinfected to avoid any risk of contamination. Produce handling containers shall be strictly for the produce and not any other use e.g. chemicals, plant debris, etc. Colour codes, symbols or any other means may be used to distinguish containers for various uses

1.8.3. HARVESTING EQUIPMENT

Harvesting buckets, designated hygienic and food grade bags, and crates shall be exclusively used for produce handling. In this regard, each operator shall ensure uniformity in harvest containers colour coding and perforate the harvest buckets on the side to avoid them being used for other purposes. The harvest equipment shall be cleaned after use to avoid build-up of dirt on the containers which may attract multiplication of harmful micro-organism.

1.9. TEMPORARY HOLDING SHED/GRADING (STORAGE)

Temporary or mobile holding or grading facilities should ensure that the produce is handled hygienically.

- Remove all harvested produce from the field daily and keep in a clean area under shade
- Prevent infestation of produce
- Ensure waste/rejected produce is not stored in the same area; produce from previous day harvest where applicable is also segregated
- Record data to maintain traceability of the harvested produce

If pods are to be sorted and packed later, store them in a cool place. A 'charcoal cooler', made of charcoal between chicken wire mesh, is useful if electricity is not available. The charcoal cooler should be designed to ensure all air passing into the cooler passes through the charcoal (no gaps in the charcoal walls). The charcoal should be kept wet to enhance the cooling effect. This can be achieved using a drip line at the top of the charcoal wall, fed from a water tank on the roof.

1.10. TRANSPORT FROM FARM TO PACKHOUSE

Vehicles used for transporting beans should be cleaned, disinfected, and, if found to be necessary by risk assessment, fumigated on a regular basis and records maintained. Transportation system shall include facilities for maintaining produce temperature at the recommended level. Records should be kept at every phase of dispatch. Refrigerated transport is highly recommended. Transportation of produce should be done in such a manner so as to avoid mechanical damage due to bruising or stacking.

Product transport vessels/vehicle(s) hygiene check should include both pre and post farm gate transport. The operator/export company shall be responsible for cleaning and maintaining the crates and the pack house transport truck. The company shall issue the group with the relevant maintenance, cleaning, and sanitation schedule for the crates and transport truck.

The Technical Advisor shall ensure inspection of the truck and the crates on arrival to establish whether they are clean and hygienic. If the truck is not clean, the Technical Advisor should suspend harvesting and send the truck back to the pack house for cleaning. Dirty crates should also be rejected. No crates shall be washed at the farms.

Cleanliness, hygiene, and sanitation shall be maintained throughout the harvesting process according to harvesting hygiene procedure.

The cleanliness of the equipment is vital. Loaded produce can be deteriorated by:

- Odours from preceding deliveries or incompatible loads.
- Residues of toxic chemical produce;
- Insects living in the equipment;
- Remains of rotting agricultural produce;
- Debris blocking the openings for evacuating the air circulating along the floor.
- Trucks and crates must be checked to verify their odor and their state of cleanliness before any new loading operation.

In this case, operators must:

- Ensure cleaning schedule for equipment and vehicles is done
- Avail a standard operating procedure for preventive maintenance of equipments
- Transport beans from farm to Packhouse in an enclosed vehicle preferably with a cooling facility

1.11. OFFLOADING AND RECEIVING

On arrival at the Packhouse, operators should;

- Remove produce packed in crates and place on pallets on designated areas
- Separate produce from different farmers and ensure each consignment is tagged
- Confirm that traceability procedures are observed
- Confirm state of PHI clearance at the farm

The export company truck shall collect the product from the respective accessible produce collection sheds on each day of harvest, as agreed with the operators. Harvested produce shall be put in crates and transported on the same day to the immediate market or packhouse.

All product dispatched by the operator will be recorded in the Produce Collection Note which shall be completed in triplicate and a copy left for the group and for the operator. Product mass balance record shall be kept on each harvest day to indicate the quantities harvested, rejected, sold and any product remaining at the farm at the end of the harvest day. This mass balance shall be verified daily by the Technical Advisor

1.12. PACK HOUSE HANDLING

Precooling is done to remove field heat for 12 hours to slow down the rate of dehydration and maintain optimum temperatures at 10°C – 14°C.

- The harvest-to-refrigeration interval must be as short as possible
- 6°C to 8°C and 80% RH (or 6°C and 90 - 95% Relative Humidity) can ensure 6 to 7 days' shelf-life from harvest to sale (high RH = mould);

SORTING & INSPECTION

- Reject pods that are perforated, twisted, injured or rotten etc.
- Reject fragments of leaf, stem, flower, plant waste and other wastes
- **Processing (Grading & Trimming)**
- Remove pods which do not meet the requirements for grade, quality and market needs
- Grade the pods to remove broken broken, twisted or blemished pods
- Grade the beans by size
- Transfer produce to the Cold room at Temperature of between 2°C – 6°C in the cold-room. Disruption in the cold chain should be avoided.

PACKING AND WEIGHING

- Select the best pods based on customer specifications and pack in punnets before transferring to secondary packaging material
- Select only boxes that are in conformity with the EU quality standard for beans on pods (standard EC 912/2001)
- Each box packed for the export market must display the product characteristics
- Weigh the produce to ensure conformity with customer and market requirements
- Palletize the boxes and transfer the pallets into the cold room
- **Storage (Finished Goods Cold Storage)**
- Arrange pallets to ensure traceability of produce is maintained and lots are stored according to shelf life and managed to ensure first in first out when releasing goods for loading
- Ensure Temperature monitoring and control at 2 – 6°C is maintained

INSPECTION AND ISSUANCE OF PHYTOSANITARY CERTIFICATE

- Present consignment to KEPHIS for visual inspection and sampling for diagnostic at the port of exit (sampling, according to the sampling plan in Annexes)
- Inspection by KEPHIS (sampling, according to the sampling plan in Annexes)

NON-CONFORMING PRODUCTS

- Monitor presence of pathogenic bacteria (sampling, according to the sampling plan in Annexes)
- Monitor MRLS (sampling, according to the sampling plan in Annexes)
- Monitor other physical deformities
- Withdraw the affected produce from dispatch

DISPATCHING/LOADING TRANSPORT FROM PACKHOUSE TO AIRPORT

- Clean and sanitize refer container before stuffing of produce begins
- Set temperatures of refer container at between 2 – 6°C
- Carefully load the pallets on the forklift and stuff carefully on the refer container
- Do documentary checks to ensure you have the packing list, invoice while ensuring other documents that includes Bill of lading, Phytosanitary certificates, certificate of origin are dully processed.





A2

PRODUCT
CONFORMITY
AND
REGULATORY
REQUIREMENTS

2.1. SANITARY AND PHYTOSANITARY REQUIREMENTS:

According to the Codex Alimentarius (CAC/RCP 20-1979), all consumers have the right to safe, wholesome and fair quality food and protection against unfair trade practices. Achieving a high level of protection of human life and health is therefore one of the fundamental objectives of all food legislation. Food hazards in primary production and processing must be identified, controlled and measures put in place to manage sanitary and/or phytosanitary risks must be subject to appropriate control by a Competent Authority.

The specifications that are given concern: foreign bodies, maximum authorised residue levels (MRLs), pathogens and mycotoxins (standards given in national, international regulations and/or by the FAO/WHO or other).

Table 12 — Sanitary and Phytosanitary Quality Requirements

NATURE OF RISK	NATURE OF THE HAZARD(S)	REQUIREMENT LEVEL MRL: (MAXIMUM RESIDUES LIMIT VALUES)"
CHEMICAL	Toxins of fungi such as <i>Fusarium</i> , in the field or post-harvest	Mycotoxins concentrations < ML set by regulations Free from microbiological pathogens.
	Pesticide residues	< MRL set by regulations
	Heavy metals (Pb, Cd, Cu, Ni, Zn, Cr) present in excessive quantities in the product.	< ML set by regulations
BIOLOGICAL	Microorganisms pathogenic to humans, present in excessive numbers on or in the product	< Complies with microbiological criteria for foodstuffs (CXS/CF 17/11/11, March 2017)
REGULATED PESTS	Pest present on or in the products	Free from any harmful organisms – as per Regulation (EU) 2016/2031 and as listed in Commission Implementing Regulation (EU) 2019/2072
PHYSICAL	Small foreign bodies such as small stones, debris, organic pieces, etc.	Free from any physical contamination

2.2. LAWS AND REGULATIONS AT NATIONAL LEVEL

1. Agriculture Act Cap 318 Plant Protection Act Cap 324
2. Agricultural Produce (Export) Act Cap 319 Agricultural Produce Marketing Cap 320 Crop Production and Livestock Cap 320 Seed and Plant Variety Act Cap 326 Suppression of Noxious Weeds Act Cap 325 Fertilizer and Animal Feedstuff Act Cap 345 Standards Act Cap 496
3. Biosafety Act 2009 (CAP 321 A) Crops Act (No.16 of 2013)
4. Public Health Act Cap 242(Rev.2002)
5. Food Drugs Chemical Substances Act Cap 254(Rev. 2002) Science and Technology (Amendment) Act, Cap 256, 1979 Pest Control Products Act (Cap 346)
6. Environmental Management and Coordination Act) (EMCA) (CAP 387No. 8 of 1999 Import, Exports and essential supplies Act Cap 502
7. Local Government Act Cap 265 Public Fees Act Cap 424 KEPHIS Act No. 54 of 2012
8. Agriculture, Fisheries and Food Authority Act No.13 of 2013

2.3. LAWS AND REGULATIONS AT THE INTERNATIONAL LEVEL

EU REGULATIONS AND DIRECTIVES

1. Commission Delegated Regulation (EU) 2019/1702 of 1 August 2019 supplementing Regulation (EU) 2016/2031 of the European Parliament and of the Council by establishing the list of priority pests
2. Regulation (EU) 2016/2031 of the European Parliament of the Council of 26 October 2016 on protective measures against pests of plants
3. Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products - brings in stricter documentary and physical checks on arrival in Europe
4. Regulation (EC) No 852/2004 of the European Parliament and of the Council of 29 April 2004 on the hygiene of foodstuffs - Article 1 - covers general hygiene provisions applicable to primary production and to related operations such as transport, warehousing and handling.
5. Regulation (EC) 178/2002 - establishes general food safety requirements and establishing the European Food Safety Authority
6. Regulation (EC) No 2073/2005 - on microbiological criteria for foodstuff and describes rules for sampling and preparation of test samples.

7. Regulation (EC) 396/2005 - establishes the EC Maximum Residue Level (MRL) Harmonisation programme. It establishes the MRLs applicable to pesticide residues.
8. Directive 2000/29/EC - lists certain harmful organisms that may be targeted by specific control measures - replaced by Regulation (EU) 2016/2031 of the European Parliament and of the Council concerning protective measures against pests of plants.
9. Commission Implementing Directive (EU) 2019/523 - amending Annexes I to V to Council Directive 2000/29/EC on protective measures against the introduction into the Community of organisms harmful to plants or plant products and against their spread within the Community.
10. Directive 93/43/EEC of 14 June 1993 on the hygiene of foodstuffs.

2.4. THE PRIVATE REPOSITORIES

In order to respect the concerns of their clients (export) in terms of product health and safety, as well as the social and environmental conditions of the product production chain on the one hand, and also to conquer new markets, several players in the sector have been engaged for some time in a process of private certification in order to comply with these requirements.

The most prominent private standards are:

KS 1758: This code stipulates the hygienic and safety requirements during the production, handling and marketing of fruits, vegetables, herbs and spices. The standard also considers the safety provisions for consumers and workers in the industry. The recommendations made in the code target production and marketing of quality horticultural fresh produce under appropriate environmental conditions.

GLOBALG.A.P. is a reference system of Good Agricultural Practices (*GAP*) recognised and applicable throughout the world. It is based on an equal partnership of agricultural operators and retailers who wish to establish effective standards and certification procedures. This certification aims to respond to consumer concerns about food safety, environmental protection, health, safety and social protection of workers and animal welfare.

GRASP: stands for GLOBALG.A.P. Risk Assessment on Social Practice. It is a voluntary, ready-to-use module developed to assess social practices on the farm, such as specific aspects of workers' health, safety, and welfare.

BRC: BRC is a Global food safety standard developed to help the food industry comply with UK and EU food safety laws, it's become an internationally recognised benchmark for best practice in food safety, quality and responsibility, with over 17,000 BRC-certified sites worldwide.

LEAF MARQUE

Linking Environment and Farming is a leading global assurance system recognising more sustainably farmed products. The principles of Integrated Farm Management (IFM) underpin the requirements of LEAF Marque certification, as set out in the LEAF Marque Standard. IFM is a whole farm business approach that delivers more sustainable farming. Modern technology and traditional methods are used with the goal of delivering a prosperous farming that enriches the environment and engages local communities.

Organic agriculture: it is defined by an agricultural management and production system that combines a high level of biodiversity with environmental practices that preserve natural resources. It also incorporates high standards of animal welfare. It responds to a growing consumer demand for natural products, while contributing to the preservation of the environment in the context of sustainable rural development.

FAIR TRADE

The objective of the Fairtrade International (FLO) Generic Fairtrade Standard for Small Operator Organisations, which is one of the best known Fairtrade standards, is to set the criteria for participation in this marketing system. These criteria aim to promote sustainable development and reduce poverty. Fair-trade certification leads to improvements in the social and economic well-being of small operators, as well as their empowerment and environmental sustainability, leading to improved quality, market access and fair and equitable incomes. Other Fair-trade standards are also developing in the international market, including FFL (Fair For Life) and SPP (the Operators' Operators' Symbol).



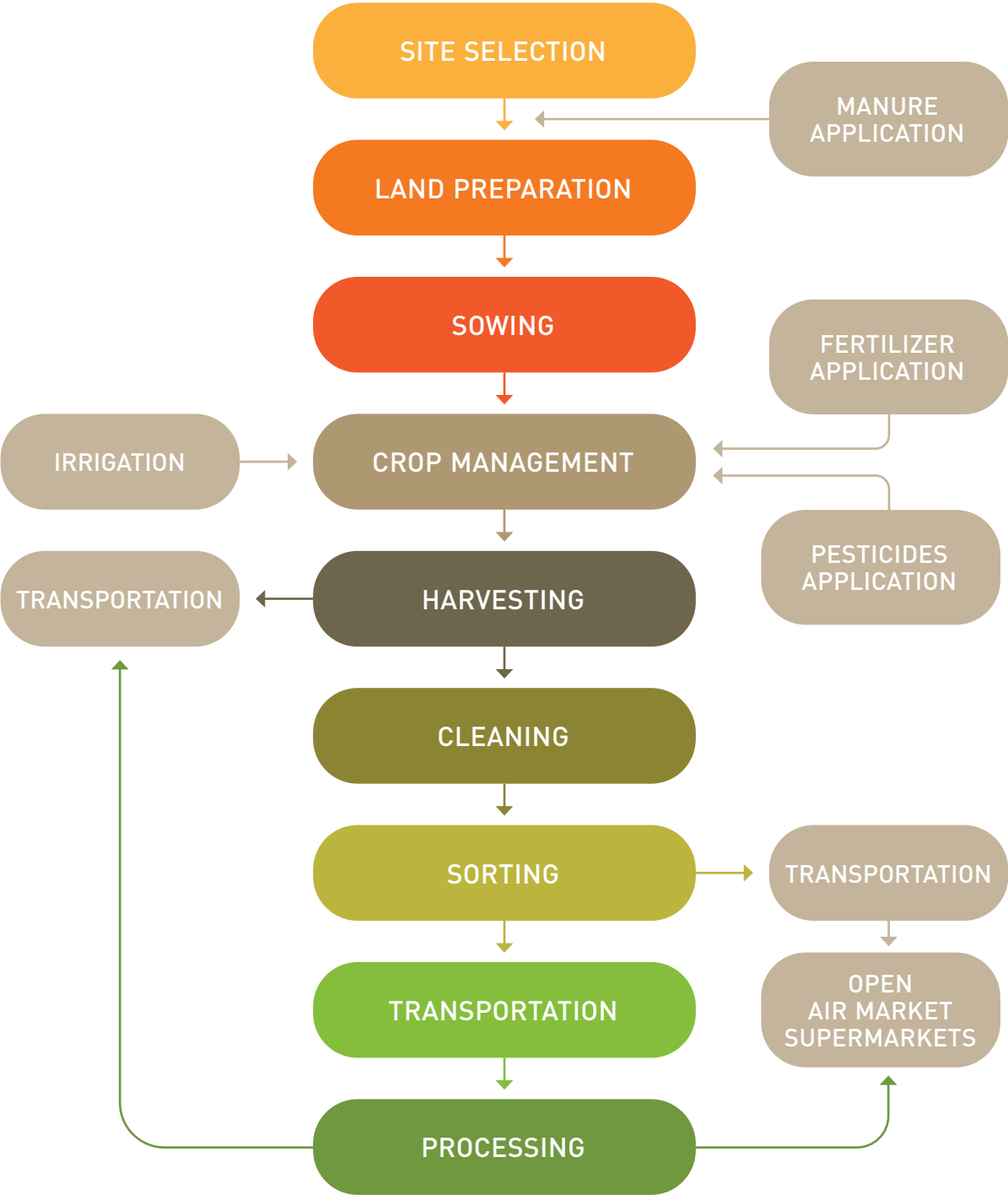


A3

DIAGRAMS OF THE
PROCESSES ADOPTED
IN THE CHAIN,
DESCRIPTION OF
THE UNIT OPERATIONS
AND IDENTIFICATION
OF THE DANGERS
LINKED TO THE
PRACTICES OBSERVED

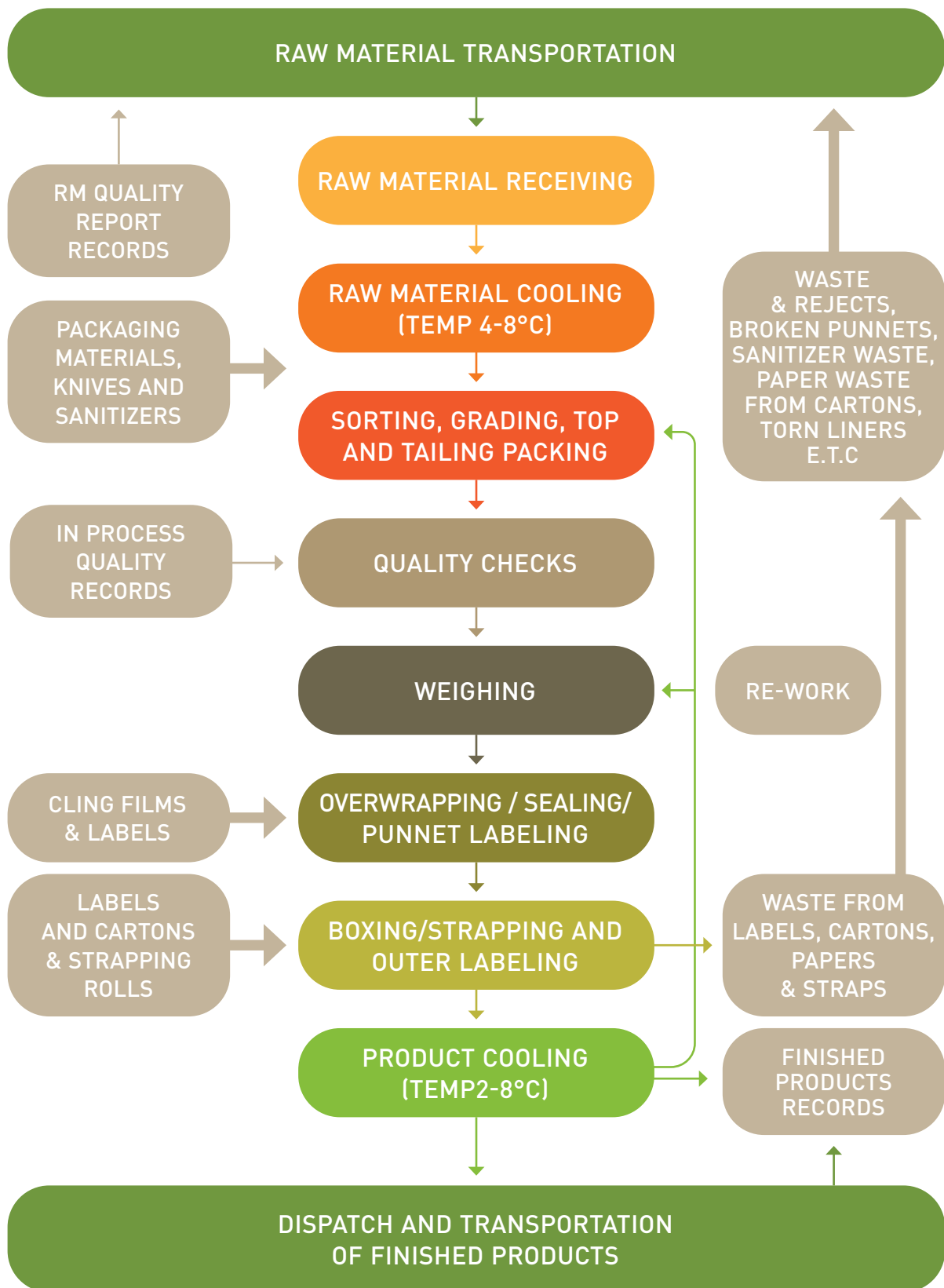
The “flow charts” below have been drawn up on the basis of observations made among the operators in the sector during the field visits which included farm visits in the beans and peas in pods growing areas as well as visits to pack houses. In order to enrich the whole presentation, interviews with Farm Managers, Packhouse managers, as well as expert opinion from industry insiders was also sought.

3.1. FLOW CHART OF PRODUCTION OPERATIONS HAZARD ANALYSIS



Source: Authors

3.2. FLOW CHART OF POSTHARVEST OPERATIONS HAZARD ANALYSIS



Source: Authors

IDENTIFICATION OF HAZARDS

The following tables describe for each stage, the unit operations essential to produce beans and peas and associated potential hazards:

1. Production-harvest-transport
2. Reception, sorting, washing, treatment, processing
3. Packaging, storage, dispatching

3.3. HAZARD ANALYSIS OF THE PROCESS FLOW

DETERMINATION OF RISK LEVELS AND PROPOSALS FOR APPROPRIATE CONTROL MEASURES

This analysis of **the level of risk**, of each hazard recognized as relevant in the beans and peas value chain, follows the analysis of the hazards identified in the diagrams for the stages at which they may appear and cause more or less serious harm, whether or not avoidable. This hazard analysis will be revised when one of the elements that have been considered is modified (regulatory evolution, change in production practices, etc).

Hazard / Risk Ranking (Threat) Matrix (*Risk characterization matrix for Food safety parameters*)

	RANKING SCORER	1 VERY UNLIKELY	2 LIKELY	3 VERY LIKELY	4 EXTREMELY LIKELY
SEVERITY (S)	1 = Low	1	2	3	4
	2 = Medium	2	4	6	8
	3 = High	3	6	9	12
	4 = Very High	4	8	12	16

Likelihood (L)

Risk Ranking (Threat) Matrix (*Risk characterization matrix for Quality parameters*)

	RANKING SCORER	1 VERY UNLIKELY	2 LIKELY	3 VERY LIKELY	4 EXTREMELY LIKELY
IMPACT (I)	1 = Low	1	2	3	4
	2 = Medium	2	4	6	8
	3 = High	3	6	9	12
	4 = Very High	4	8	12	16

Likelihood (L)

KEY: HAZARD / RISK TOLERANCE - LEVELS OF RISK CHARACTERIZATION

- Score < 4: low risk = PRP programmes required prerequisite: maintain compliance with all “Good Practices” (GHP, GAP,...). When the score is low, the respect of PRP can easily control the risks.
- GREEN colour represents scores between 1 and 4. PRP doesn’t need specific verifications (checks are made in routine).
- Score from 6 to 8: moderate risk = PA point of attention: preventive measures and regular monitoring (checks) will have to be put in place.
- When the score indicate a “moderate risk” a YELLOW colour is used (“point of attention”).

It means that PRP could not be sufficient to control the risks. Specific measures are required for these risks. Verifications are made in routine too (according to a sampling plan).

- Score > 9: high risk = PC control point: control measures accompanied by checks will be essential and emergency action must be provided for in the event of non-compliance detected (e.g., exceeding the MRL). When the score is high, specific measures AND specific verifications are required for these risks (according to a sampling plan).
- In this case The RED colour is appropriate.

1- 4 = Low Risk	GREEN	RECOMMENDATION Insignificant hazard – Tolerable - No action	Controlled by PRP (GAP or GHP)
5-8 = Medium risk	YELLOW	MINOR Tolerable- Controlled by PRP’s if chemical or physical hazard or quality related issue Intolerable- Controlled in SPS Control plan if biological hazard	Controlled by PA for tolerable and CP for intolerable
9-16 = High Risk	RED	MAJOR for Food safety Intolerable - Controlled in SPS Control plan	Controlled by CCP
	BLUE	MAJOR for Quality Intolerable - Controlled in SPS Control plan	Controlled by CP

Table 13 — Hazard Identification Process

PROCESS STEP	PRODUCTION OPERATION	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS	ACCEPTABLE LIMITS
<p>STEP 1 SITE SELECTION</p> <ul style="list-style-type: none"> Select a suitable production site for the production of beans/peas taking into account - possible contamination from the soil or surrounding areas Select the production site based on availability of water and suitability to grow the crop Check the history of the site after conversion from pastureland Carry out a soil analysis to understand the nutrient status/deficiency of the soil Ensure the site is away from visible contamination sources e.g. dumping sites 	<p>STEP 2 LAND PREPARATION</p> <ul style="list-style-type: none"> Check if there exists residue material from the previous crop and destroy Ensure shrubs and stumps are cleared from the land Plant fence/ barrier – vegetation Ensure thorough cleaning of hard ploughing and harrowing machinery as they may be a source of weeds seeds when not cleaned before commencement of the work 	<p>Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp.</i>, FCM, African bollworm, etc.)</p>	<p>Acceptable Limits for Heavy Metals:</p> <ul style="list-style-type: none"> Confirm this through soil testing – maximum limits for heavy metals shall not exceed Cadmium – 0.8mg/kg, Chromium – 100mg/kg, Copper – 36mg/kg, Lead – 85mg/kg and Nickel 35mg/kg of soil
<p>Infectious Pathogens: Bacteria and other pathogenic organisms arising from human and animal waste</p>	<p>Acceptable Limits for Infectious Pathogens:</p> <ul style="list-style-type: none"> As Low as Reasonably Achievable concentration of pathogenic bacteria in soil 	<p>Acceptable Limits for pests: Absence on the site of regulated (quarantine) pests</p>	

STEP 5 FERTILIZER & MANURE APPLICATION	STEP 4 WEEDING	STEP 3 SOWING	PROCESS STEP
<ul style="list-style-type: none"> Carry out fertilizer application in line with soil nutrient requirements based on soil analysis report Apply D.A.P fertilizer at planting, the rate is approximated per square area Apply N.P.K and urea at vegetative growth stage <p>OR</p> <ul style="list-style-type: none"> Apply very well-rotted composted organic manure 	<ul style="list-style-type: none"> Ensure initial weeding is done by hand using simple tools with minimal disturbance on the soil Take care not to damage shallow roots especially during the first weeding 	<ul style="list-style-type: none"> Check the nutrient & chemical status of your soil before planting Operators must ensure they source Seeds only from approved suppliers or authorised agro-dealers 	PRODUCTION OPERATION
<ul style="list-style-type: none"> Infectious Pathogens: Bacteria and other pathogenic organisms arising from application of organic fertilizers and manure 	<ul style="list-style-type: none"> Heavy metals in excessive concentrations: soil polluted by fertilizers (contaminated mainly by Cd, As, Pb) 		IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<ul style="list-style-type: none"> Acceptable Limits for infectious pathogens: <ul style="list-style-type: none"> As Low As Reasonably Achievable concentration of pathogenic bacteria in final produce (vegetable products harvested should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	<ul style="list-style-type: none"> Acceptable Limits for heavy metals: <ul style="list-style-type: none"> Low concentrations of heavy metals in fertilizers (ex: for each percent available phosphate (P2O5), the fertilizing material shall not exceed the following concentrations: arsenic, 2 ppm; cadmium, 4 ppm; lead, 20 ppm.) 		ACCEPTABLE LIMITS

STEP 6 USE OF PLANT PROTECTION PRODUCTS (PPP)	PROCESS STEP
<ul style="list-style-type: none"> • Ensure only approved Plant Protection Products approved for use in Kenya by the PCPB are used • Strictly adhere to the dosage of PPP as per the label or as advised by the technical assistants; in their absence the operator makes the decision 	PRODUCTION OPERATION
<ul style="list-style-type: none"> • Pesticide Residues > MRL values due to: <ul style="list-style-type: none"> • No respect of GAP (dosage, PHI, maximum number of applications) • Unapproved PPP for crop • Use of PPP not registered for use in country of production • Use of prohibited PPP • Use of obsolete PPP • Use of counterfeit products • Inappropriate choice of pesticides • Incorrect application of pesticides • Poor sprayer calibration • Drift from /on neighbouring crops • Inadequate training of spraying personnel 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable Limits for pesticide residues:</p> <ul style="list-style-type: none"> • Respective MRL values accepted in EU (Refer to Table 8-&9 Recommended Plant protection products and their dosages - Insecticides, miticides and nematocides) 	ACCEPTABLE LIMITS

STEP 8 HARVESTING	STEP 7 IRRIGATION	PROCESS STEP
<ul style="list-style-type: none"> • Pick up the pods carefully • Ensure pods have stalk still attached to it • Place the harvested products in collection crates • Regularly bring harvested pods into shade • Grades the pods to remove broken, twisted or blemished pods 	<ul style="list-style-type: none"> • Provide water as needed and avoid wastage. • Use irrigation water of verified quality • In case of a borehole, check if extraction permit for water source are from relevant authorities 	PRODUCTION OPERATION
<ul style="list-style-type: none"> • Infectious Pathogens (eg <i>Salmonella</i>, <i>E. coli</i>, <i>Listeria monocytogenes</i>) due to: <ul style="list-style-type: none"> • Inadequate toilets vis-à-vis number of employees also if not available or not used; location of toilets within reasonable proximity to workplace • Lack of compliance with good hygiene practices • Lack of maintenance of materials for harvesting • Placing produce on bare ground <p>Acceptable limits for Infectious Pathogens:</p> <ul style="list-style-type: none"> • Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	<ul style="list-style-type: none"> • Chemicals: from upstream irrigation (water contaminated with chemicals from spray tank washings and leftovers, agrochemicals (pesticides, organic/inorganic fertilisers); irrigation water contaminated by spray drift or upstream farming activity, agricultural runoff) • Infectious Pathogens in irrigation water (waste water usage or sewer water from the rivers) <p>Acceptable Limits for contaminants in Irrigation water:</p> <ul style="list-style-type: none"> • Refer to <i>Standards for Irrigation Water – Kenya</i> Source: <i>LEGAL Notice No. 120 Environmental Management and Co-Ordination (Water Quality) Regulations, 2006</i> (table No 7) 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable limits for Infectious Pathogens:</p> <ul style="list-style-type: none"> • Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	<p>Acceptable Limits for contaminants in Irrigation water:</p> <ul style="list-style-type: none"> • Refer to <i>Standards for Irrigation Water – Kenya</i> Source: <i>LEGAL Notice No. 120 Environmental Management and Co-Ordination (Water Quality) Regulations, 2006</i> (table No 7) 	ACCEPTABLE LIMITS

STEP 8 HARVESTING	PROCESS STEP		
	PRODUCTION OPERATION		
<ul style="list-style-type: none"> ● Pesticide Residues > MRL values due to: <ul style="list-style-type: none"> ● No respect of GAP (dosage, PHI, maximum number of applications) ● Unapproved PPP for crop ● Use of PPP not registered for use in country of production ● Use of prohibited PPP ● Use of obsolete PPP ● Use of counterfeit products ● Inappropriate choice of pesticides ● Incorrect application of pesticides ● Poor sprayer calibration ● Drift from /on neighbouring ` crops ● Inadequate training of spraying personnel 	<ul style="list-style-type: none"> ● Foreign Bodies (soil particles, metal fragments, glass and plastics) 	<ul style="list-style-type: none"> ● Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm, etc.) 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable Limits for pesticide residues: Respective MRL values accepted in EU (Refer to Table 8-&9 Recommended Plant protection products and their dosages - Insecticides, miticides and nematocides)</p>	<p>Acceptable Limits for foreign bodies:</p> <ul style="list-style-type: none"> ● Absence of metallic and non-metallic foreign bodies with diameter > 1 mm 	<p>Acceptable Limits for Quarantine Pests:</p> <ul style="list-style-type: none"> ● Absence of regulated pests (quarantine) pests on the produce 	ACCEPTABLE LIMITS

STEP 9 TEMPORARY HOLDING SHED/GRADING	STEP 8 HARVESTING	PROCESS STEP
<ul style="list-style-type: none"> Remove all harvested produce from the field daily and keep in a clean area under shade Prevent infestation of produce Ensure waste/rejected produce is not stored in the sStep 9 Temporary holding shed/Grading 		PRODUCTION OPERATION
<ul style="list-style-type: none"> Chemicals (Cleaning detergents, Grease and Oils) Cross contamination Mixed storage of produce with non-food items 	<ul style="list-style-type: none"> Infectious pathogens due to: <ul style="list-style-type: none"> animal and bird droppings, Waste materials/ crop residues Inadequate sanitation facilities Contaminated water (for hand wash, equipment) Contaminated equipment e.g. brooms Contamination through sick employees 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable limits for chemicals:</p> <ul style="list-style-type: none"> Nil traces/films of soap, detergents, sanitizers 	<ul style="list-style-type: none"> Perforated pods, damaged, marked, twisted, injured/rotten. small caliber pods etc <p>Acceptable Limits for Damaged Pods: Nil damaged pods</p>	ACCEPTABLE LIMITS

STEP 10 TRANSPORT FROM FARM TO PACKHOUSE	STEP 9 TEMPORARY HOLDING SHED/GRADING		PROCESS STEP
<ul style="list-style-type: none"> • Ensure cleaning schedule for equipment and vehicles is done • Avail a standard operating procedure for preventive maintenance of equipments • Transport beans from farm to Packhouse in an enclosed vehicle preferably with a cooling facility 			PRODUCTION OPERATION
<ul style="list-style-type: none"> • Bruised/damaged/injured pods 	<ul style="list-style-type: none"> • Infectious pathogens due to: <ul style="list-style-type: none"> • Contaminated water (for hand wash, equipment) • Contaminated equipment e.g. brooms • Contamination through sick employees 	<ul style="list-style-type: none"> • Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp.</i>, FCM, African bollworm, etc.) 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<ul style="list-style-type: none"> • Acceptable limits of Bruised/damaged/injured pods: <ul style="list-style-type: none"> • Nil traces of bruised/damaged/injured pods 	<ul style="list-style-type: none"> • Acceptable limits for Infectious Pathogens: <p>Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards)</p> 	<ul style="list-style-type: none"> • Foreign Bodies (soil particles, metal fragments, glass and plastics) 	ACCEPTABLE LIMITS

STEP 10 TRANSPORT FROM FARM TO PACKHOUSE		PROCESS STEP
		PRODUCTION OPERATION
<ul style="list-style-type: none"> • Foreign Bodies (soil particles, metal fragments, glass and plastics) 	<ul style="list-style-type: none"> • Regulated pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Liriomyza spp</i>, FCM, African bollworm, etc.) 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<ul style="list-style-type: none"> • Acceptable limits for foreign bodies (glass, etc.): <ul style="list-style-type: none"> • Nil glass, stones, plastics, metal fragments etc • Absence of metallic and non-metallic foreign bodies with diameter > 1 mm 	<ul style="list-style-type: none"> • Chemicals due to: <ul style="list-style-type: none"> • Contaminated vessels/ vehicles • Residues from Vehicle cleaning chemicals (detergents) • Cleaning/sanitising agents 	ACCEPTABLE LIMITS
	<ul style="list-style-type: none"> • Acceptable Limits for Regulated Pests: <ul style="list-style-type: none"> • Absence on the produce 	<ul style="list-style-type: none"> • Acceptable limits for chemicals: <ul style="list-style-type: none"> • Nil traces of Soap, detergents, sanitizers

PROCESS STEP	STEP 11 OFFLOADING AND RECEIVING		STEP 12 SORTING & INSPECTION	STEP 11 OFFLOADING AND RECEIVING	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS	ACCEPTABLE LIMITS
	<ul style="list-style-type: none"> Remove produce packed in crates and place on pallets on designated areas Separate produce from different farmers and ensure each consignment is tagged Confirm that traceability procedures are observed Confirm state of PHI clearance 	<ul style="list-style-type: none"> Reject pods that are perforated, twisted, injured or rotten etc. Reject fragments of leaf, stem, flower, plant waste and other wastes 	<ul style="list-style-type: none"> Reject pods that are perforated, twisted, injured or rotten etc. Reject fragments of leaf, stem, flower, plant waste and other wastes 	<ul style="list-style-type: none"> Foreign bodies (soil particles, metal fragments, glass and plastics) 	<ul style="list-style-type: none"> Infectious Pathogens due to: <ul style="list-style-type: none"> Contaminated pallets Contaminated employees Contaminated lifting and leaking equipment Sick employees 	<ul style="list-style-type: none"> Acceptable Limits for Infectious Pathogens: <ul style="list-style-type: none"> Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards)
			<ul style="list-style-type: none"> Regulated Pests carried from the field (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm, etc.) 	<ul style="list-style-type: none"> Acceptable limits for foreign bodies (glass, etc.): <ul style="list-style-type: none"> Nil glass, plastics, metal fragments etc Absence of metallic and non-metallic foreign bodies with diameter > 1 mm 	<ul style="list-style-type: none"> Acceptable Limits for Infectious Pathogens: <ul style="list-style-type: none"> Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	<ul style="list-style-type: none"> Acceptable Limits for Infectious Pathogens: <ul style="list-style-type: none"> Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards)
			<ul style="list-style-type: none"> Acceptable Limits for Regulated Pests: <ul style="list-style-type: none"> Absence on/in the produce 			

STEP 13 PROCESSING (GRADING & TRIMMING)	STEP 12 SORTING & INSPECTION		PROCESS STEP
<ul style="list-style-type: none"> Remove pods which do not meet the requirements for grade, quality and market needs Grade the pods to remove broken, twisted or blemished pods Grade the beans by size 			PRODUCTION OPERATION
<ul style="list-style-type: none"> Foreign Bodies (soil particles, metal fragments, glass and plastics) 	<ul style="list-style-type: none"> Infectious pathogens due to: <ul style="list-style-type: none"> Employees not using PPE Sick employees Produce getting into contact with unclean sorting equipments and dirt on wall and floor 	<ul style="list-style-type: none"> Foreign Bodies (soil particles metal & plant fragments, glass, plastics stones etc.) 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<ul style="list-style-type: none"> Acceptable limits for foreign bodies (glass, etc.): <ul style="list-style-type: none"> Absence of metallic and non-metallic foreign bodies with diameter > 1 mm 	<ul style="list-style-type: none"> Acceptable limits for Infectious Pathogens: <ul style="list-style-type: none"> Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	<ul style="list-style-type: none"> Bruised/Deformed pods 	ACCEPTABLE LIMITS
		<ul style="list-style-type: none"> Acceptable limits for foreign bodies (glass, etc.): <ul style="list-style-type: none"> Nil soil particles, plant fragments, stones etc Absence of metallic and non-metallic foreign bodies with diameter > 1 mm 	

STEP 15 STORAGE (FINISHED GOODS COLD STORAGE)	STEP 14 PACKING AND WEIGHING	PROCESS STEP
<ul style="list-style-type: none"> Arrange pallets to ensure traceability of produce is maintained and lots are stored according to shelf life and managed to ensure first in first out when releasing goods for loading Ensure Temperature monitoring and control at 2 – 6°C is maintained 	<ul style="list-style-type: none"> Select the best pods based on customer specifications and pack in punnets before transferring to secondary packaging material Select only boxes that are in conformity with the EU quality standard for beans on pods (standard EC 912/2001) Each box packed for the export market must display the product characteristics Weigh the produce to ensure conformity with customer and market requirements Palletize the boxes and transfer the pallets into the cold room 	PRODUCTION OPERATION
<ul style="list-style-type: none"> Infectious Pathogens: bacteria (<i>E-coli</i>), due to; <ul style="list-style-type: none"> Loss of temperature control as a result of loss of power or power fluctuation resulting in breaking of cold chain leading to microbial growth 	<ul style="list-style-type: none"> Foreign Bodies coming from packaging offcuts, dust from packaging materials, etc. 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable limits for Infectious Pathogens:</p> <ul style="list-style-type: none"> Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	<p>Acceptable limits for foreign bodies:</p> <ul style="list-style-type: none"> Nil physical hazard like packaging offcuts, dust and stones in produce Absence of metallic and non-metallic foreign bodies with diameter > 1 mm 	ACCEPTABLE LIMITS
	<p>Acceptable limits for Infectious Pathogens:</p> <ul style="list-style-type: none"> Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards) 	

STEP 16 NON-CONFORMING PRODUCTS	PROCESS STEP
<ul style="list-style-type: none"> • Monitor presence of pathogenic bacteria (sampling, according to the sampling plan in Annexes) • Monitor MRLS (sampling, according to the sampling plan in Annexes) • Monitor other physical deformities • Withdraw the affected produce from dispatch 	PRODUCTION OPERATION
<ul style="list-style-type: none"> • Pesticide Residues > MRL values due to: <ul style="list-style-type: none"> • Use of obsolete PPP • No respect of GAP (dosage, PHI, maximum number of applications) • Inappropriate choice of pesticides • Unapproved PPP for crop • Use of PPP not registered for use in country of production • Use of prohibited PPP 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable Limits for pesticide residues: Respective MRL values accepted in EU (Refer to Table 8-&9 Recommended MRLs for PPP used)</p>	ACCEPTABLE LIMITS
<ul style="list-style-type: none"> • Infectious Pathogens due to: <ul style="list-style-type: none"> • Lack of compliance with good hygiene practice • Placing produce on bare ground 	
<p>Acceptable limits for Infectious Pathogens: Bacteria- Absent in 25g of the final product (products should be compliant with European Regulation (EC) No. 2073/2005 for microbial hazards)</p>	

STEP 18 INSPECTION AND ISSUANCE OF PHYTOSANITARY CERTIFICATE	STEP 17 - DISPATCHING/LOADING TRANSPORT FROM PACKHOUSE TO AIRPORT	PROCESS STEP
<ul style="list-style-type: none"> Present consignment to KEPHIS for visual inspection and sampling for diagnostic at the port of exit (sampling, according to the sampling plan in Annexes) Inspection by KEPHIS (sampling, according to the sampling plan in Annexes) 	<ul style="list-style-type: none"> Clean and sanitize refer container before stuffing of produce begins Set temperatures of refer container at between 2 – 6°C Carefully load the pallets on the forklift and stuff carefully on the refer container <p>Do documentary checks to ensure you have the packing list, invoice while ensuring other documents like Bill of lading, Phytosanitary certificates, certificate of origin are duly processed</p>	PRODUCTION OPERATION
<ul style="list-style-type: none"> Quarantine Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp.</i>, <i>FCM</i>, <i>African bollworm</i> etc 	<ul style="list-style-type: none"> Chemicals on trucks, Moulds due to; contaminated pallets – not properly cleaned/ sanitised or Cross contamination if vehicles are not adequately cleaned 	IDENTIFICATION OF HAZARDS IN THE PRODUCTION PROCESS
<p>Acceptable Limits for pests: Absence on/in the produce (zero tolerance)</p>	<p>Acceptable limits for chemicals:</p> <ul style="list-style-type: none"> Nil Soap, detergents, sanitizers 	ACCEPTABLE LIMITS

Table 14 – Hazard Analysis at Farm Level - Production-harvest-transport

STEP 4 WEEDING	STEP 3 SOWING	STEP 2 LAND PREPARATION	STEP 1 SITE SELECTION	PROCESS STEP
		<ul style="list-style-type: none"> Infectious Pathogens: Bacteria and other pathogenic organisms arising from human and animal waste 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm, etc.) 	<ul style="list-style-type: none"> Presence of heavy metals in soil (Pb, Cd, As,...) in excessive concentrations
-	-	4	4	SEVERITY/ IMPACT
-	-	1	1	LIKELIHOOD
-	-	4	3	RISK CHARACTERIZATION (FINAL SCORE)
-	-	PRP	PRP	CATEGORISATION (PRP, PA OR CP, CCP)
	<ul style="list-style-type: none"> Do not allow animals to enter or graze on the plots Provision of toilets within the farm vicinity and ensure proper use of toilets Training of employees on personal hygiene and proper sanitation Proximity of toilet facilities with regard to work areas 	<ul style="list-style-type: none"> Visual examination of the site (potential hosts of pests will be destroyed) Avoid sowing beans near another crop that is infested by pests that may attack beans <p>For more detailed information, please refer to Table 8 above</p>	<ul style="list-style-type: none"> Site history assessment – consider previous land use with regards to previous crops and former use. Do soil analysis for any new site before production according to the sampling plan to determine whether the site is suitable for production or not Do not use soil where non-treated wastewater has been used. 	CONTROL MEASURE

STEP 5 FERTILIZER AND MANURE APPLICATION			PROCESS STEP
<ul style="list-style-type: none"> Infectious Pathogens: Bacteria (<i>E. coli</i>) and pathogenic organisms arising from manure 	<ul style="list-style-type: none"> Infectious Pathogens: Bacteria and other pathogenic organisms arising from organic fertilizers 	<ul style="list-style-type: none"> Presence of heavy metals in soil (Pb, Cd, As,...) in excessive concentrations 	DANGERS/ SPECIFIC HAZARD CONSIDERED
4	4	3	SEVERITY/ IMPACT
1	1	2	LIKELIHOOD
4	4	6	RISK CHARACTERIZATION (FINAL SCORE)
PRP	PRP	PA	CATEGORISATION (PRP, PA OR CP, CCP)
<ul style="list-style-type: none"> Where manure is used, risk assessment and microbiological analysis must be done to avoid soil infections. Ensure Pathogenic micro-organisms are absent in animal waste/manure before use Use fully decomposed manure 	<ul style="list-style-type: none"> Hygiene at field and personal level Use fully decomposed manure 	<ul style="list-style-type: none"> Buy fertilizers only from approved dealers Confirm this through certificates of fertilizer analysis provided by the seller 	CONTROL MEASURE

STEP 6 USE OF PLANT PROTECTION PRODUCTS (PPP)		PROCESS STEP
Presence of Pests on Pods		DANGERS/ SPECIFIC HAZARD CONSIDERED
4	4	SEVERITY/ IMPACT
3	3	LIKELIHOOD
12	12	RISK CHARACTERIZATION (FINAL SCORE)
CCP	CCP	CATEGORISATION (PRP, PA OR CP, CCP)
		CONTROL MEASURE
<ul style="list-style-type: none"> • Even distribution of PPPs • Proper application of PPPs 	<ul style="list-style-type: none"> • Pesticides with low or no PHI (e.g. <i>Bacillus thuringiensis</i>) could be recommended to avoid MRL exceedance if spraying is done close to harvest. • Use biopesticides or low risk substances with no MRL values; (no PHI) • Traceability: Establish full record keeping for all PPP applications • Active measures to avoid the risk of pesticide drift from own plots to neighbouring production areas e.g. planting vegetative buffers at the edges of cropped fields • Ensure compliance with all pre-harvest intervals (if necessary, delay harvest to be compliant with the PHI) 	<ul style="list-style-type: none"> • Proper disposal of surplus mix or tank washings to ensure there is no risk to food safety nor to the environment • Ensure PPP storage complies with all the appropriate current national, regional and local legislation and regulations. • Ensure correct handling and filling procedures followed as stated on the label • Refresher training of farmers on proper use of PPPs • Calibration of PPP application equipment

STEP 7 IRRIGATION		PROCESS STEP
Chemicals from upstream irrigation	Infectious Pathogens in irrigation water (waste water usage or sewer water from the rivers)	DANGERS/ SPECIFIC HAZARD CONSIDERED
2	4	SEVERITY/ IMPACT
2	3	LIKELIHOOD
4	12	RISK CHARACT-ERIZATION (FINAL SCORE)
PRP	CCP	CATEGORISATION (PRP, PA OR CP, CCP)
<ul style="list-style-type: none"> Handle PPP according to their registered use to prevent their transfer to other parts of the environment including proper storage Identify location where the use of PPP, organic/inorganic fertilizer could contaminate water sources through runoff or drift Implement practices that can reduce runoff and possible contamination of irrigation water such as mulching, cover crops, conservation agriculture Use contained areas for mixing of PPP; also ensure mixing is done away from water sources and excessive PPP mix is diluted adequately before disposal in soak pit located away from water sources Proper management of spills Use of vegetative barriers at the edges of cropped fields 		CONTROL MEASURE
<ul style="list-style-type: none"> Risk assessment of irrigation water source to identify potential sources of pollution and contamination upstream, groundwater etc. Ensure irrigation water meets the national water quality standards (Refer to figure 13-Standards for irrigation water) Test water quality and monitor - water analysis for potential microbial contamination, pesticide residues and heavy metals Water channels to be located away from sanitary facilities Avoid animals grazing upstream of a river abstraction point Use of irrigation method that ensure no contact of harvestable part of the crop with irrigation water e.g. drip irrigation Use of fences and other barriers for wells, ponds, used for surface water storage Ensure storage of manure and composting sites are located away to avoid leachates towards water source Prevent flood water from reaching crops e.g. use ditches. 		

STEP 8 HARVESTING		PROCESS STEP		
		DANGERS/ SPECIFIC HAZARD CONSIDERED	SEVERITY/ IMPACT	LIKELIHOOD
3	Perforated pods, damaged, marked, twisted, injured/rotten. small caliber pods etc.	<ul style="list-style-type: none"> Foreign bodies like stones, personal effects, plastics etc 	4	4
3		<ul style="list-style-type: none"> Pesticide residues > MRL 	4	3
9		<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CP	<ul style="list-style-type: none"> Infectious Pathogens (eg <i>Salmonella</i>, <i>E. coli</i>, <i>Listeria monocytogenes</i>) 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CP	<ul style="list-style-type: none"> Training of personnel on proper harvesting techniques Use of trained personnel to harvesting time 	<ul style="list-style-type: none"> Foreign bodies like stones, personal effects, plastics etc 	4	3
CP	<ul style="list-style-type: none"> Check in records if PPP used are approved Observance of dosage, PHI and maximum number of applications (respect of GAP for each PPP sprayed on the crop) If needed (ex: PHI or dosage not respected), conduct a risk assessment to evaluate the potential risk of MRL exceedance 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CP	<ul style="list-style-type: none"> Ensure crates are clean Do not place products or crates directly on the ground during harvesting. 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CCP	<ul style="list-style-type: none"> Check in records if PPP used are approved Observance of dosage, PHI and maximum number of applications (respect of GAP for each PPP sprayed on the crop) If needed (ex: PHI or dosage not respected), conduct a risk assessment to evaluate the potential risk of MRL exceedance 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CCP	<ul style="list-style-type: none"> Food handlers wellbeing Provision of hygiene equipment and procedures Worker hygiene training Use of clean harvesting containers Harvesting containers must be exclusive for harvesting only Use of the right PPE Use of spacer "crates" to ensure that the crate with produce is not placed directly on the soil 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CP	<ul style="list-style-type: none"> Pest control checks at farm level before harvesting by field officers Stop harvesting from the affected field Advise to change pest control products or processes at the field if pest infestation persists Dispose/reject affected crop/plots as appropriate <p>For more detailed information, please refer to Table 8 above</p>	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3
CCP	<ul style="list-style-type: none"> Food handlers wellbeing Provision of hygiene equipment and procedures Worker hygiene training Use of clean harvesting containers Harvesting containers must be exclusive for harvesting only Use of the right PPE Use of spacer "crates" to ensure that the crate with produce is not placed directly on the soil 	<ul style="list-style-type: none"> Regulated Pests (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, FCM, African bollworm etc 	4	3

STEP 9 TEMPORARY HOLDING SHED/GRADING				PROCESS STEP
Regulated Pests (e.g. <i>Helicoverpa armigera</i> , <i>Bemisia tabaci</i> , <i>Trialeurodes</i> <i>vaporariorum</i> , <i>Lyriomiza spp.</i> , <i>FCM</i> , <i>African bollworm</i> , etc.)	Foreign Bodies (Glass and plastics, Soil)	Chemicals (Cleaning detergents)	Infectious pathogens (eg <i>Salmonella</i> , <i>E.coli</i> , <i>Listeria</i> , <i>monocytogenes</i>)	DANGERS/ SPECIFIC HAZARD CONSIDERED
4	2	2	4	SEVERITY/ IMPACT
1	1	1	1	LIKELIHOOD
4	2	2	4	RISK CHARACTERIZATION (FINAL SCORE)
PRP	PRP	PRP	PRP	CATEGORISATION (PRP, PA OR CP, CCP)
<ul style="list-style-type: none"> Visual inspection of produce to check the presence of regulated quarantine pests Dispose/reject affected produce as appropriate Pest control checks at the farm level before harvesting by field officers Advise to Change Pest control products or processes at the field if pest infestation persists <p>For more detailed information, please refer to Table 8 above</p>	<ul style="list-style-type: none"> Put in place glass breakage and handling procedures and ensure compliance 	<ul style="list-style-type: none"> Use food grade detergents Use appropriate cleaning procedures with water rinses of all equipment cleaned with detergents Adopt a machine maintenance planning to avoid spillage and leakages of oil or grease 	<ul style="list-style-type: none"> Holding store should be exclusive for harvested produce Regular cleaning and maintenance of the holding facility Provision of waste receptacles and regular removal of the waste Ensure water used for washing the area and equipment meets quality parameters set by national authority KEBS Pest control – structure to ensure no ingress of rodents, birds etc Training of workers Provision of hygiene equipment and procedures Cleaning of equipment – exclusive for the holding area 	CONTROL MEASURE

STEP 10 TRANSPORT – FARM TO PACKHOUSE					PROCESS STEP
Foreign bodies (Glass and plastics)	Regulated pests	Chemicals	Bruised/damaged/ injured pods	Infectious pathogens (e.g. <i>Salmonella</i> , <i>E. coli</i> , <i>Listeria</i> , <i>monocytogenes</i>)	DANGERS/ SPECIFIC HAZARD CONSIDERED
2	4	2	3	4	SEVERITY/ IMPACT
1	1	1	3	3	LIKELIHOOD
2	4	2	9	12	RISK CHARACTERIZATION (FINAL SCORE)
PRP	PRP	PRP	CP	CCP	CATEGORISATION (PRP, PA OR CP, CCP)
<ul style="list-style-type: none"> Glass and hard plastics procedures 	<ul style="list-style-type: none"> Cleaning procedures in place and reinforced Pests and insects traps Hygiene training for staff <p>For more detailed information, please refer to Table 8 above</p>	<ul style="list-style-type: none"> Thorough cleaning of transport vessels before use Use approved products/chemicals for cleaning Use appropriate cleaning procedures with water rinses of all equipment used for transport and cleaned with detergents Hygiene procedures/ Proper cleaning 	<ul style="list-style-type: none"> Use of crates during transportation and handling Use of trained personnel during harvesting to sort and grade produce 	<ul style="list-style-type: none"> Use appropriate cleaning procedures with water rinses of all equipment used for transport and cleaned with detergents Proper design to avoid contamination Training of workers Provision of hygiene equipment and procedures To provide procedures for not mixing raw and finished material Refrigeration 	CONTROL MEASURE

Table 15 – Hazard Analysis for Packhouse - Reception to Dispatch

STEP 12 SORTING AND INSPECTION	STEP 11 OFFLOADING AND RECEIVING	PROCESS STEP
<p>Infectious Pathogens (e.g. <i>E coli</i>, <i>Staph aureus</i>)</p>	<p>Regulated Pests carried from the field (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes</i> <i>vaporariorum</i>, <i>Lyriomiza spp.</i>, FCM, African bollworm, etc.)</p>	<p>DANGERS/SPECIFIC HAZARD CONSIDERED</p>
4	4	SEVERITY/IMPACT
1	2	LIKELIHOOD
4	8	RISK CHARACTERIZATION (FINAL SCORE)
PRP	PA	CATEGORIZATION (PRPS, PA, CP, OR CCP)
<ul style="list-style-type: none"> Ensuring proper hygiene by produce handlers Refresher trainings by staff on Good Hygiene Practices 	<ul style="list-style-type: none"> Visual inspection of produce to check the presence of regulated quarantine pests Dispose/reject affected produce as appropriate Pest control checks at the farm level before harvesting by field officers Advise to Change Pest control products or processes at the field if pest infestation persists <p>For more detailed information, please refer to Table 8 above</p>	<p>CONTROL MEASURE(S)</p> <ul style="list-style-type: none"> Ensuring proper hygiene by produce handlers Refresher trainings by staff on packhouse entry procedures.

STEP 13 PROCESSING (GRADING AND TRIMMING)		STEP 12 SORTING AND INSPECTION		PROCESS STEP
Foreign Bodies e.g. soil particles metal & plant fragments, glass, plastics stones etc.	Infectious Pathogens (e.g. <i>E. coli</i> , <i>Staph aureus</i>)	Foreign Bodies e.g. soil particles metal & plant fragments, glass, plastics stones etc.	Bruised/deformed pods	DANGERS/SPECIFIC HAZARD CONSIDERED
2	4	2	3	SEVERITY/IMPACT
1	1	1	1	LIKELIHOOD
2	4	2	3	RISK CHARACTERIZATION (FINAL SCORE)
PRP	PRP	PRP	PRP	CATEGORIZATION (PRPS, PA, CP, OR CCP)
<ul style="list-style-type: none"> Ensure crates are clean Do not place products or crates directly on the ground during sorting and inspection 	<ul style="list-style-type: none"> Ensuring proper hygiene by produce handlers Refresher trainings by staff on packhouse entry procedures. 	<ul style="list-style-type: none"> Ensure crates are clean Do not place products or crates directly on the ground during sorting and inspection 	<ul style="list-style-type: none"> Remove bruised/deformed pods and consider disposing off to the local market or to animal feed manufacturers 	CONTROL MEASURE(S)

STEP 15 STORAGE (FINISHED GOODS COLD STORAGE)	STEP 14 PACKING AND WEIGHING		PROCESS STEP
Infectious Pathogens (<i>E-coli</i>)	Foreign Bodies	Infectious Pathogens (e.g. <i>E. coli</i> , <i>Staph. Aureus</i> , mold)	DANGERS/SPECIFIC HAZARD CONSIDERED
4	2	4	SEVERITY/IMPACT
2	1	3	LIKELIHOOD
8	2	12	RISK CHARACTERIZATION (FINAL SCORE)
PA	PRP	CCP	CATEGORIZATION (PRPS, PA, CP, OR CCP)
<ul style="list-style-type: none"> • Cooling at Temperatures between 2°C - 6°C • Calibration of Temperature measuring devises in the cold room • Review cleaning regimes as appropriate. • Precool produce to acceptable dispatch temperatures • Refresher trainings for key staff on temperature regime and monitoring • Control stacking to facilitate proper cooling of produce • Ensure cold room is locked when not in use 	<ul style="list-style-type: none"> • Refresher training for staff on packaging and weighing procedures • Institute incidence management procedures 	<ul style="list-style-type: none"> • Re-enforcement of good hygiene practices • Reinforce procedures for reporting sickness and have adequate and well trained staff to handle incidence management • Proper management of packaging materials during procurement and storage of the packaging materials • Sourcing of packaging materials from only approved suppliers. 	CONTROL MEASURE(S)

STEP 17 - DISPATCHING/LOADING/ TRANSPORTATION TO AIRPORT	STEP 16 NON-CONFORMING PRODUCTS			PROCESS STEP
Chemicals on trucks, Moulds due to; contaminated pallets – not properly cleaned/ sanitised or cross contamination if vehicles are not adequately cleaned	Pesticide Residues >MRL Values	Quarantine Pests (e.g. <i>Helicoverpa armigera</i> , <i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i> , <i>Lyriomiza spp</i> , <i>FCM</i> , <i>African bollworm etc</i>)	Infectious Pathogens (<i>E-coli</i>)	DANGERS/SPECIFIC HAZARD CONSIDERED
2	4	4	4	SEVERITY/IMPACT
1	3	1	1	LIKELIHOOD
2	12	4	4	RISK CHARACTERIZATION (FINAL SCORE)
PRP	CCP	PRP	PRP	CATEGORIZATION (PRPS, PA, CP, OR CCP)
<ul style="list-style-type: none"> Thorough cleaning of transport vessels before use Use approved products/chemicals for cleaning Use appropriate cleaning procedures with water rinses of all equipment used for transport and cleaned with detergents Hygiene procedures/ Proper cleaning Repair any tools or malfunctioning equipment 	<ul style="list-style-type: none"> Conduct a risk assessment to evaluate the potential risk of MRL exceedance Withdraw non-conforming products For residues >MRL values, destroy final produce 	<ul style="list-style-type: none"> Visual inspection of produce to check the presence of regulated quarantine pests Dispose/reject affected produce as appropriate 	<ul style="list-style-type: none"> Re-enforcement of good hygiene practices Reinforce procedures for reporting sickness and have adequate and well trained staff to handle incidence management 	CONTROL MEASURE(S)

STEP 18. INSPECTION & ISSUANCE OF PHYTOSANITARY CERTIFICATE	PROCESS STEP
Quarantine Pests (e.g. <i>Helicoverpa armigera</i> , <i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i> , <i>Lyriomiza spp</i> , <i>FCM</i> , <i>African bollworm etc</i>)	DANGERS/SPECIFIC HAZARD CONSIDERED
4	SEVERITY/IMPACT
3	LIKELIHOOD
12	RISK CHARACTERIZATION (FINAL SCORE)
CCP	CATEGORIZATION (PRPS, PA, CP, OR CCP)
<ul style="list-style-type: none"> • Carry out inspection at farm and later at the Pack House • Dispose off non-conforming produce • Prepare necessary documents including invoice, packing list etc needed before issuance of certificate • Visual inspection of produce to check the presence of regulated quarantine pests • Dispose/reject affected produce as appropriate <p>Traceability & Tracking of lots</p> <ul style="list-style-type: none"> • Product Conformity • Ensure accuracy and additional declarations contained in the Phytosanitary Certificate • Confirm that certificate is issued in one of the FAO languages. For Kenya it must be in English <p>For more detailed information, please refer to Table 8 above</p>	CONTROL MEASURE(S)



A41

DETERMINATION
OF RISK LEVELS
AND PROPOSAL
OF APPROPRIATE
CONTROL
MEASURES FOR
THE SECTOR

4.1. SPS CONTROL PLAN

The following table lists **the checks to be carried out** on the production, processing and packaging process (**self-checks**): documentary checks, visual checks, measurements, product inspections, sampling for the analysis of biological or chemical contaminants, sampling for phytosanitary diagnosis.

This table is intended for:

- Facilitating the development by industry professionals of a “Check List” for conducting valid internal audits (Part B of the Guide).
- Facilitating external controls (third party certification inspections and official controls): “control points”, which should be the focus of inspectors’ attention, are thus identified - with their minor and major requirements.

The **periodicity and nature of the verifications** (technical aspects to be checked by the auditors and internal auditors), as well as the records to be made are indicated in the table which can therefore be considered as the “**SPS Control Plan**”.

Among the various checks to be indicated in the table are the following:

Documentary checks (*recording of operations carried out, compliance with procedures and instructions in the practical sheets used, etc.*) are carried out by the company’s staff.), *identity and physical checks.*

Visual checks: *easy to carry out, often effective in terms of basic hygiene measures for example (PRP). They have the disadvantage of being dependent on the experience of the observer and his or her degree of tolerance in relation to the instructions. They are nevertheless the most numerous. These checks are carried out using the Check Lists in Part B.*

Measurements: *this involves using an instrument or appliance to take a measurement of a parameter (e.g., taking a temperature measurement in a cold room, measuring a pH, measuring Brix). The result is known instantly, so that corrective action can be taken just as quickly. For these “measurements”, due to the lack of well-calibrated and/or well-used equipment, they are often “checks” giving indicative values. These checks are carried out using the checklists in Part B.*

Internal inspections: *these are carried out by the quality manager who “inspects” the operations carried out during the work. He checks that instructions are being followed and makes sure that the necessary records have been noted during the work. Most of the inspection is carried out in the form of a documentary and visual check. These checks are carried out using the checklists in Part B.*

Phytosanitary diagnostic tests: *determination of regulated pests possibly suspected to be present during surveillance and/or certification.*

Contaminant analyses: *microbiological analyses, search for foreign bodies, water quality, levels of nitrates, residues, heavy metals, mycotoxins and other contaminants, etc. These analyses are rarely carried out on site (it is sometimes possible for certain microbiological analyses). They are most often entrusted to external laboratories “accredited” according to the ISO 17025 standard.*

In case of analysis, rules concerning sampling will have to be included in the GPG. This will range from methods and frequencies to the way in which these operations will be organised

4.1.1. SPS PLAN FOR THE FARM OPERATIONS

Table 16 — SPS Plan for the farm operations

S.N	PROCESS STEP	NATURE AND SOURCE OF HAZARD TO BE CONTROLLED	RECOMMENDED LEVEL OF REQUIREMENT	PREVENTIVE/ RECOMMENDED CONTROL MEASURES	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)	CORRECTION/ CORRECTIVE ACTION
1	Step 5 – Fertilizer and Manure application	<ul style="list-style-type: none"> Presence of heavy metals in fertilizer (Pb, Cd, As....) in excessive concentrations 	Minor	<ul style="list-style-type: none"> Buy fertilizers only from approved dealers Confirm this through certificates of fertilizer analysis provided by the seller 	<p>Documentary checks</p> <ul style="list-style-type: none"> Confirm that the fertilizers to be used is certified/approved. (See record sheet 7) Confirming from the records the age of the manure before application (<i>should be at least 6 months</i>) <p>Monitoring/Scouting</p> <p>Routine monitoring for nutrient deficiency symptoms on the plant and pods</p> <p>Measurement control:</p> <p>Soil fertility tests to be done periodically (annually)</p>	Carry out a Soil testing / leaf analysis to inform fertilizer and manure application including testing the manure to know what quality it is before application

S. N	PROCESS STEP	NATURE AND SOURCE OF HAZARD TO BE CONTROLLED	RECOMMENDED LEVEL OF REQUIREMENT	PREVENTIVE/ RECOMMENDED CONTROL MEASURES	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)	CORRECTION/ CORRECTIVE ACTION	
3	2	Step 6 – Use of Plant Protection Products (PPP)					
		<p>Presence of pests on pods (e.g. <i>Helicoverpa armigera</i>, <i>Bemisia tabaci</i>, <i>Trialeurodes vaporariorum</i>, <i>Lyriomiza spp</i>, <i>FCM</i>, <i>African bollworm</i> etc)</p>	<p>Major</p>	<ul style="list-style-type: none"> • Even distribution of PPPs • Proper application of PPPs 	<p>Major</p> <ul style="list-style-type: none"> • Use of only approved pest control products. • Observe pre-harvest interval • Use products as per the instructions for use • Training of personnel on proper application of PPPs and adherence of PPPs application guidelines. • No inter-cropping 	<p>Documentary control:</p> <ul style="list-style-type: none"> • Checking the list of authorized PPPs on the crop Checking the list at every use • Verification of the recording of the phytosanitary treatments carried out during cultivation: record activities of crop protection treatment (see record sheet No14). <p>Internal inspections:</p> <ul style="list-style-type: none"> • Verification of the application of Crop protection treatment procedures 	<p>Discard affected pods if unauthorized PPPs are used or pre-harvest interval not observed</p> <p>Adoption of IPM practices for management of pests (see table 8 for signs and symptoms of common pests of beans and their management)</p>
		<p>Discard affected pods if unauthorized PPPs are used or pre-harvest interval not observed</p> <p>Training of personnel on proper safe use of pesticides</p>					

5	4	S. N
<p>Step 8 – Harvesting</p>	<p>Step 7 – Irrigation</p>	<p>PROCESS STEP</p>
<p>Infectious pathogens (eg <i>Salmonella</i>, <i>E. coli</i>, <i>Listeria</i>, <i>monocytogenes</i>)</p>	<p>Infectious Pathogens in Irrigation water or from waste water (eg <i>Salmonella</i>, <i>E. coli</i>, <i>Listeria</i>, <i>monocytogenes</i>)</p>	<p>NATURE AND SOURCE OF HAZARD TO BE CONTROLLED</p>
<p>Major</p> <ul style="list-style-type: none"> • Providing hand washing stations at convenient locations • Good handling practices(GHP) • Provision of hygiene equipment and procedures • Worker hygiene training • Use of the right PPE • Use of spacer “crates” to ensure that the crate with produce is not placed directly on the soil 	<p>Major</p> <ul style="list-style-type: none"> • Do water analysis to ascertain water quality before use 	<p>RECOMMENDED LEVEL OF REQUIREMENT</p> <p>PREVENTIVE/ RECOMMENDED CONTROL MEASURES</p>
<p>Internal inspections Supervision to ensure equipment and containers used during harvesting meet minimum requirements Documentary control:</p> <ul style="list-style-type: none"> • Ensure proposer record keeping of all harvesting operation. Ensure only manure and disease free pods are harvested (See record sheet 17) 	<p>Measurement control Controlled irrigation using only water that meet quality standards (Refer to table 7) Sample and analyze water for irrigation both at the beginning and at the end of the season</p>	<p>CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)</p>
<p>Period testing of pods (See table 6) Maintenance of the equipment</p>	<p>Monitor water quality in the farm and put in place-controlled irrigation using only water from known sources</p>	<p>CORRECTION/ CORRECTIVE ACTION</p>

6	S.N
Step 8 – Harvesting	PROCESS STEP
Regulated Pests (e.g. <i>Helicoverpa armigera</i> , <i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i> , <i>Lyriomiza spp</i> , <i>FCM</i> , <i>African bollworm</i> etc)	NATURE AND SOURCE OF HAZARD TO BE CONTROLLED
Major	RECOMMENDED LEVEL OF REQUIREMENT
<ul style="list-style-type: none"> • Proper scouting regime • Training of personnel on proper scouting practices • Maintenance of field equipment 	PREVENTIVE/ RECOMMENDED CONTROL MEASURES
<p>Visual checks Visual checks to ensure workers wash hands before scouting activities</p> <p>Documentary control: Checking the frequency of scouting and management of the pests. (see record sheet 12 and 13.)</p> <p>Internal inspections Supervisor to ensure personnel are well trained and that they are carrying out the scouting activities in the right manner</p>	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)
Training of personnel on scouting and pest management and good hygiene practices	CORRECTION/ CORRECTIVE ACTION

7	S.N
Step 8 – Harvesting	PROCESS STEP
Pesticide residues > MRL, oil, lubricants, fertilizers from dirty equipment and packaging /holding materials, oil and lubricant leaks from oil equipment	NATURE AND SOURCE OF HAZARD TO BE CONTROLLED
Major	RECOMMENDED LEVEL OF REQUIREMENT
<ul style="list-style-type: none"> ● Observe recommended GAPs (dosage, PHI, maximum number of applications) ● Avoid application of pesticides with long PHI close to harvesting ● Use of clean recommended containers and crates for holding pods ● Respect of GHPs 	PREVENTIVE/ RECOMMENDED CONTROL MEASURES
<p>Internal inspections Supervision to ensure PPE and sprayers meet minimum requirements</p> <p>Documentary control:</p> <ul style="list-style-type: none"> ● Confirmation and recording of applications of PPPs ● Checking the list of authorised PPPs on the crop Checking the list once / season ● Verification of the recording of the phytosanitary treatments carried out during cultivation: sheet to check compliance with the PHT. Systematic control at harvest time (Record Sheet No. 14) ● Verification of the application of the emergency procedure, if applicable Verification of the follow-up of the crisis management procedure of residues > MRLs (Record Sheet No. 23) 	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)
Cleaning and disinfection of containers before use	CORRECTION / CORRECTIVE ACTION

S.N	PROCESS STEP	NATURE AND SOURCE OF HAZARD TO BE CONTROLLED	RECOMMENDED LEVEL OF REQUIREMENT	PREVENTIVE/ RECOMMENDED CONTROL MEASURES	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)	CORRECTION / CORRECTIVE ACTION
9	Step 10 – Transportation to Packhouse or collection centers	Infectious pathogens (e.g. <i>Salmonella</i> , <i>E. coli</i> , <i>Listeria</i> , <i>monocytogenes</i>)	Major	<ul style="list-style-type: none"> Use appropriate cleaning procedures with water rinses of all equipment used for transport and cleaned with detergents Proper design to avoid contamination Training of workers Provision of hygiene equipment and procedures To provide procedures for not mixing raw and finished material Refrigeration Provision of procedures for not mixing raw and finished material 	<p>Visual Inspection Ensure produce are transported only on covered vehicles</p> <p>Documentary control: Keeping Temperature logs for controlled temperature transportation</p>	Training on proper handling of produce and monitoring tools
8	Step 8 – Harvesting	Perforated pods, damaged, marked, injured/rotten. small caliber pods etc	Major	<ul style="list-style-type: none"> “Extra fine beans” pick every day “Fine beans” pick every second day Pick and handle with great care Lay in rigid container and do not pile more than 20cm deep 	<p>Visual checks Checks to confirm that the pods have reached the right physiological maturity before harvesting.</p> <p>Measurements</p> <ul style="list-style-type: none"> Measure width of pods according to caliber classes (e.g Extra fine-maximum 6mm, Fine-maximum 9mm) Sampling and analysis of products at harvest to measure residue levels <p>Analyse two batches of 1 kg out of 100 (2%)</p>	Remove damaged pods from consignment and dispose of appropriately (sell to animal feed manufacturers)

S. N	PROCESS STEP	NATURE AND SOURCE OF HAZARD TO BE CONTROLLED	RECOMMENDED LEVEL OF REQUIREMENT	PREVENTIVE/ RECOMMENDED CONTROL MEASURES	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)	CORRECTION/ CORRECTIVE ACTION
10	Step 10 – Transportation to Packhouse or collection centers	Bruised/damaged/injured pods due to poor handling resulting in damage and bruising of pods	Major	<ul style="list-style-type: none"> Transportation in crates for bulk transport Use of refrigerated trucks during transportation for long distances 	<p>Visual Inspection Visual checks to ensure bruised/damaged/injured pods are not included in the consignment</p> <p>Documentary control: Keeping records of rejected produce (Record Sheet No. 24)</p>	Remove damaged pods from consignment and dispose of appropriately (sell to animal feed manufacturers)

4.1.2. SPS PLAN FOR THE PACKHOUSE

Table 17 — SPS Plan for the Packhouse Operations

S/N	PROCESS STEP	NATURE AND SOURCE OF DANGER TO BE CONTROLLED	RECOMMENDED LEVEL OF REQUIREMENT	PREVENTIVE/ RECOMMENDED CONTROL MEASURES	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)	CORRECTION/ CORRECTIVE ACTION
1	Step 12 – Sorting and Inspection	Pests (regulated/quarantine pests) [e.g. <i>Helicoverpa armigera</i> , <i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i> , <i>Lyriomiza spp</i> , <i>FCM</i> , <i>African bollworm</i> etc)	Major	<ul style="list-style-type: none"> Visual inspection of produce to check the presence of regulated quarantine pests Dispose/reject affected produce as appropriate Pest control checks at the farm level before harvesting by field officers Advise to Change Pest control products or processes at the field if pest infestation persists 	<p>Visual checks Visual checks to ensure consignment is free from regulated pests</p> <p>Documentary control: Checking the frequency of scouting and management of the pests. (see record sheet 12 and 13.)</p> <p>Internal inspections Supervisor to ensure personnel are well trained and that they are carrying out the scouting activities in the right manner</p>	Ensure personal hygiene and sanitation through training Ensure procedures are in place to ensure produce traceability is maintained
2	Step 14 – Packing and weighing	Infectious Pathogens (e.g. <i>E. coli</i> , <i>Staph. Aureus</i> , mold due to poor hygiene practices, lack of control over health status, unsanitized food contact surfaces, use of unclean cartons)	Major	<ul style="list-style-type: none"> Providing hand washing stations at convenient locations Cleaning and good maintenance of food contact surfaces Good handling practices GHPs 	<p>Documentary control Calibration records of the weighing machines</p> <p>Measurement Sampling of packed cartons and verifying weights at a specified interval</p> <p>Internal inspections Supervision of hand-packing operations</p>	Re-sorting and repacking Training of personnel

4	3	S/N
Step 16 – Non-conforming Products	Step 15 – Storage (Finished Goods Cold Storage)	PROCESS STEP
Pesticide Residues>MRL Values	Infectious Pathogens (e.g. <i>Salmonella</i> , <i>E. coli</i> , <i>Listeria</i> , <i>monocytogenes</i>)	NATURE AND SOURCE OF DANGER TO BE CONTROLLED
Major	Minor	RECOMMENDED LEVEL OF REQUIREMENT
<ul style="list-style-type: none"> Conduct a risk assessment to evaluate the potential risk of MRL exceedance Withdraw non-conforming products For residues>MRL values, destroy final produce 	<ul style="list-style-type: none"> Cooling at Temperatures between 4°C - 6°C Calibration of Temperature measuring devices in the cold room Review cleaning regimes as appropriate. Precool produce to acceptable dispatch temperatures Refresher trainings for key staff on temperature regime and monitoring Control stacking to facilitate proper cooling of produce Ensure cold room is locked when not in use 	PREVENTIVE/RECOMMENDED CONTROL MEASURES
Visual Checks -Inspect, reject, treat non-conforming product (as appropriate) (See record Sheet No. 24) -Inspect to ensure export conditions are met	Documentary control: Ensure proper record keeping and review of records of the GHPs Internal inspections Supervisor to ensure good hygiene practices are adhered with (See fact Sheet 6) Measurement: Sample of packed cartons and verify is temperatures are within range	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)
Re-sorting and repacking Training of personnel	<ul style="list-style-type: none"> Maintenance of the equipments 	CORRECTION / CORRECTIVE ACTION

S/N	PROCESS STEP	NATURE AND SOURCE OF DANGER TO BE CONTROLLED	RECOMMENDED LEVEL OF REQUIREMENT	PREVENTIVE/ RECOMMENDED CONTROL MEASURES	CHECKS AND REGISTRATIONS (MONITORING: SELF-CHECK)	CORRECTION/ CORRECTIVE ACTION	
5	Step 17 – Inspection & Issuance of Phytosanitary Certificate	Quarantine Pests (e.g. <i>Helicoverpa armigera</i> , <i>Bemisia tabaci</i> , <i>Trialeurodes vaporariorum</i> , <i>Lyriomiza spp</i> , <i>FCM</i> , <i>African bollworm</i> etc)	Major	<p>Audit and carry out the inspection at the farm and packhouse</p> <ul style="list-style-type: none"> Dispose off non-conforming produce Prepare necessary documents including invoice, packing list etc needed before issuance of certificate Visual inspection of produce to check the presence of regulated quarantine pests Dispose/reject affected produce as appropriate <p>Traceability & Tracking of lots</p> <ul style="list-style-type: none"> Product Conformity Ensure accuracy and additional declarations contained in the Phytosanitary Certificate Confirm that certificate is issued in one of the FAO languages. For Kenya it must be in English <p>For more detailed information, please refer to Table 8 above</p>	<p>Phytosanitary diagnostic tests</p> <p>New/unknown pests detected at the farm must be reported for identification in order to establish the proper management action(s) (See record sheet No. 12)</p> <p>Check presence of pest at Packhouse and at point of exit</p>	<p>Measurement</p> <p>Sampling of packed cartons and verifying weights and quality at a specified interval</p> <p>Internal inspections</p> <p>Supervision of hand-packing operations</p> <p>Carry out lab testing before issuance of certificate of analysis</p>	Ensure procedures are in place to ensure produce traceability is maintained

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FACTSHEETS, REGISTRATION FORMS AND CHECKLISTS

This part of the guide contains a series of documents useful for operators to demonstrate their good control of SPS risk





B1

PRACTICAL
SHEETS
(OPERATING
PROCEDURES)

1. INTRODUCTION

Sampling is an administrative act of great importance. It can affect a litigation procedure, or even lead to the closure of a business. Thus, the sampling technique, sampling conditions, nature, quantity and quality of samples, as well as their storage and transport conditions, must follow precise, defined and codified procedures.

A laboratory will reject a sample that does not comply with the guidelines. As a result, at each point of the “laboratory inspection” sequence, a worker should not hesitate to consult the laboratory technician for advice on how to take samples in conditions compliant with regulations.

The inspectors must have information on the contact details of the controlling and testing body on which their control structure depends.

From acceptance of the raw produce up to delivery of the final products to the client diverse quality checks are taking place. Through these checks, the quality of the product is guaranteed. Also, the rejected products must be stored accordingly or if necessary, destroyed.

Inspection of products will first of all be done for the regulated pests: In this case, a visual inspection is the first step, done immediately after harvest and during packaging.

An “official” inspection is then done in order:

- a. To deliver a Phytosanitary Certificate in a process which SHOULD FOLLOW THE RULE of IPPC (ISPM n°31). ISPM 31. 2008 “*Methodologies for sampling of consignments. Rome, IPPC, FAO. 2015-07*”
- b. To test the compliance with pesticide residues “at random” AND according to a sampling plan adopted in the sector.

Based on:

- FAO/WHO. 1999. Recommended Methods of Sampling for the Determination of Pesticide Residues for Compliance with MRLs (CAC/GL 33-1999). Joint FAO/WHO Food Standards Programme, FAO, Rome.
- COMMISSION DIRECTIVE 2002/63/EC of 11 July 2002 establishing Community methods of sampling for the official control of pesticide residues in and on products of plant and animal origin and repealing Directive 79/700/EEC
- CODEX: CAC/GL 50-2004. The Codex General Guidelines on Sampling (CAC/GL 50-2004) are based on the principals of acceptance sampling. They are designed to ensure that fair and valid sampling procedures are used when food is being tested for compliance with a particular Codex commodity standard.

Inspection for **QUALITY**: will be separated from inspection done for **SAFETY / COMPLIANCE** for Plant Health and Food Safety (SPS); This will follow OECD Guidelines for Fruit & Veg (OECD Scheme for the Application of International Standards for Fruit and Vegetables- OECD, Decision of the Council revising the OECD Scheme for the Application of International Standards for Fruit and Vegetables, OECD/LEGAL/0346, 2022.

The “Scheme” promote uniform quality control procedures and the use of the model control certificate.

The criteria on the degree of development and /or ripeness are checked using the instruments and methods laid down to this end in the relevant standard or in accordance with OECD Guidelines on *Objective Tests to Determine Quality of Fruits and Vegetables and Dry AND Dried Produce*.

2. GOAL

Sampling of consignments of beans on pods is done for inspection and/or testing in order to;

- Detect regulated pests
- Provide assurance that the number of regulated pests or infested units in a consignment does not exceed the specified tolerance level for the pest
- Provide assurance of the general phytosanitary condition of a consignment
- Optimize the probability of detecting specific regulated pests
- Maximize the use of availability sampling resources
- Gather other information such as for monitoring of a path way
- Verify compliance with phytosanitary requirements
- Determine the proportion of the consignment infested

3. SCOPE

All handled products of Beans on pods in nature

4. RESPONSIBILITIES

The Quality Assurance manager is responsible for supervision and implementation of the different quality checks and the registering of possible defects of the products at arrival.

5. IMPLEMENTATION

General Rules for Sampling Vegetables

The following procedures are based on methods of sampling recommended by the Codex Alimentarius Commission and the Food and Agriculture Organization. It has been prepared in consultation with the private operators in Kenya and is considered valid for the sector. Below steps are required;

- Separate samples should be sent for distinct lots of produce. Submit separate samples to the laboratory if you are dealing with different cultivars or varieties of produce, areas of crop which have different chemical treatments, or which have been sprayed on different days, produce sourced from different growers for packing or processing.
- Do not freeze fresh produce. As a general rule, all samples, especially samples of perishable fresh produce should be kept cool BUT NOT FROZEN. However, samples of already frozen foods should be kept frozen, until they reach the laboratory.
- Individual vegetables should not be cut or divided.

6. SAMPLING FOR THE CONTROL OF PESTICIDE RESIDUES IN AND ON BEANS AND PEAS PRODUCTS ACCORDING TO THE DIRECTIVE 2002/63/EC

Methods of sampling for the determination of pesticides residues for compliance with maximum residue levels (MRLs) were developed and agreed by the Codex Alimentarius Commission. The provisions laid down in this Directive apply to the sampling of products of plant and animal origin in order to determine the level of pesticide residues in vegetable products.

The objective of these sampling procedures is to enable a representative sample to be obtained from a lot for analysis to determine compliance with maximum residue levels (MRLs) for pesticides. The methods and procedures laid down incorporate those recommended by the Codex Alimentarius Commission.

A MRL for a plant product takes into account the maximum level expected to occur in a composite sample, which has been derived from multiple units of the treated product and which is intended to represent the average residue level in a lot. In consequence, MRLs for plant products apply to a **composite bulk sample derived from one to ten primary samples**.

The primary samples taken from a lot. A “Lot” is a quantity of a food material delivered at one time and known, or presumed, by the sampling officer to have uniform characteristics such as origin, producer, variety, packer, type of packing, markings, consignor, etc. Example: all produce harvested on the same parcel/field the same day/week.

Where a consignment is comprised of lots which can be identified as originating from different growers, etc., each lot should be considered separately.

Each primary sample should be taken from a randomly chosen position in the lot, as far as practicable. The primary samples must consist of sufficient material to provide the laboratory sample(s) required from the lot.

The minimum number of primary samples to be taken from a single lot is determined from Table 1: Minimum number of primary samples to be taken from a lot:

1. according to the weight of the lot (in kg)
2. according to the number of cartons in the lot

WEIGHT OF LOT	KG
< 50	3
50-500	5
> 500	10

OR

NUMBER OF CANS, CARTONS OR OTHER CONTAINERS IN THE LOT	
1-25	1
26-100	5
> 100	10

The minimum size of samples is 1 kg (Table 2).

Table 2 Plant products: description of primary samples and minimum size of laboratory samples

	COMMODITY CLASSIFICATION (')	EXAMPLES	NATURE OF PRIMARY SAMPLE TO BE TAKEN	MINIMUM SIZE OF EACH LABORATORY SAMPLE
PRIMARY FOOD COMMODITIES OF PLANT ORIGIN				
1.	All fresh fruits All fresh vegetables including potatoes and sugar beets and excluding herbs			
1.1.	Small sized fresh products units generally <25 g	Berries, peas, olives	Whole units, or packages, or units taken with a sampling device	1 kg

7. QUALITY CHECK AT FIELD

Representative samples of the crop must be taken by a recognized procedure. Each plant must have an equal chance of being chosen. For a better estimate of the residue status of the crop, take duplicate samples.

- Sample parts of the crop that normally constitute the marketable produce; in this case the pods.
- Avoid taking diseased or under sized crop parts or produce at a stage when it would not normally be harvested.
- Take samples in such a way as to be reasonably representative of typical harvesting practice
- Take care not to remove surface residues during handling, packing or preparation.
- Sample and bag the required weight of samples in the field and do not sub-sample
- Keep records of the samples taken and the method used.

8. QUALITY CHECK AT ACCEPTANCE

To effectively control regulated pests in the supply chain, samples should be taken at the point of product reception to the packhouse. This is a critical stage following the HACCP approach. Although plant health protection measures should be implemented during production following guidelines provided in the GPG. After weighing of the produce on arrival, a sample of the produce of 1 Kg is randomly taken for assessment at the Quality Control in load table by the Quality Controller on duty. Immediately thereafter, a pre-graded raw material report is issued. The sample is checked on the length of the produce, the diameter and general quality aspects, such as rust and mechanical damages. (See list below.) The temperature is also taken and recorded on that same report.

The raw material is checked on the following criteria:

	EXTRA FINE BEANS	FINE BEANS	MANGE TOUT	SUGAR SNAPS
TT				
LENGTH	10 – 15 cm	10 – 15 cm	5 – 10 cm	5 – 10 cm
DIAMETER	5.5 – 7.5 mm	5.5 – 7.5 mm	2 – 3mm	6 – 9 mm
DC/BAGS				
LENGTH	10 – 12 cm	10 – 13 cm	5 – 10 cm	5 – 10 cm
DIAMETER	5.5 – 7.5 mm	5.5 – 7.5 mm	2 – 3 mm	6 – 9 mm

Criteria for raw material check

The table below shows the criteria that is used for the raw material check.

DEFECTS ON BEANS	DEFECTS ON MANGE TOUT/SUGAR SNAPS
Rusts	Black/green spots
Thrip bites	Rot spots
Rotting	Caterpillar damages
Caterpillar damage	Under- and/or oversize
Under- and/or oversize	Mechanical damage
Mechanical damage	Curved pod shape
Curved beans	Deformed/stringy pods
Deformed pods	Blisters
Stringy pods	Browning
Bruising/skin marks	Dehydration
Dehydrations	Seeding
Seeding	Chemical traces
Chemical traces	Dirt/muddy
Dirt/muddy	

9. QUALITY CHECKS DURING PROCESSING

While processing, where Online check form exist has to be filled in, otherwise a physical form is just as good. This form tells us about the quality of each lot number. Any damage on the produce is written down. Other information such as the pack house code, the table number, the table head and the traceability number are also captured. Finally, data on the quality of the produce received is captured and is given a score ranging from 0 to 4 where 4 is the highest quality.

A second inspection is done on the weight and the packaging. A separate form “**Weight and seal integrity**” form is used to ensure that every product is weighted and sealed according to the standards of the customer. The weighing and sealing must be done very precisely.

10. FINAL QUALITY CHECK

Before shipping is done, a final quality check is conducted to verify whether or not beans just about to be shipped actually meet customer specifications and thereafter a “Quality assessment report” is prepared. All scores are calculated resulting in a rejection rate per lot number.

If the quality scores turn out to be lower than expected, then the Quality Manager is contacted for a further review of this findings.

11. INSPECTION OF PACKAGING MATERIAL AND CLEANING MATERIAL

At delivery, the quantity and quality (sealed) of the packaging material is checked. The delivery notes of the packaging material are then signed by the supervisor on duty.

12. REJECTED LOTS

The Implementing regulation (EU) 2019/2072 requires 10% of the samples selected randomly for examination (visually inspected) to be assessed using a destructive sampling method. If any regulated pest larva or their different forms is found inside the product or within the package, the appropriate lot is rejected. The regulation recommends a zero tolerance for regulated pests. Rejected lots are stored separately from the rest. If the lot is rejected permanently, the lot is returned or gets dumped. Defective individual products/packaging is removed immediately and is disposed of.

SAMPLING ANALYSIS

SN	ITEM	PROCESS	PARAMETER TESTED	FREQUENCY
1	Soil	Sample and analyze soil before sowing every year	-Soil PH -Organic Content -Soil Texture -Nutrient levels (N,P,K)	Annually
2	Water	Sample and analyze water for irrigation at the beginning and at the end of the season	pH value, Total Dissolved Solids Lead, Cadmium, Total Chromium, Aluminium, Copper, Selenium, Cobalt, Boron, Zinc, Iron, Arsenic, Chloride, Fluoride, Escherichia coli, & Sodium Absorption Ratio (SAR)	Once
3	Fertilizer	Sample and analyze manure before use and ensure Fertilizer is sourced from approved dealers	-Presence of heavy metals	Once
4	MRLs	Sample test for MRLs at the farm and at the Pack House	MRL exceedance	Once for every lot
5	Quarantine Pests	Visual Check the presence of the pests at the farm and at the Packhouse	Determination of regulated pests during surveillance and/or certification	Once for every lot
6	Contaminant analyses	Microbiological analyses, search for foreign bodies, water quality, levels of nitrates, residues, heavy metals, mycotoxins and other contaminants	Determination of acceptable limits	Once for every lot

13. FORMS AND REFERENCES

- Pre-graded raw material report.
- Online checks form.
- Quality assessment report.

a. Storage

Proper pesticide storage is important to **protect people, animals**, the environment and the **pesticide** itself. Keep these tips in mind when storing pesticides:

b. Container

- **Pesticides** should be stored in their original containers. The original container is designed to protect the product and it's made of materials that will withstand the chemicals in the product
- Store containers with their **original labeling** which includes application and **disposal** directions, **ingredient** names and **emergency** information.
- The original container also has the appropriate lid/cap to **protect leakage**.

c. Temperature

- Extremes in temperature can change the chemistry of some pesticides inside the container.
- Extremes in temperature can also damage containers.
- Always read the label for storage instructions. As a general rule, pesticides are best stored between 4°C to 32°C.

d. Location

- Designate a place that is only used for pesticide storage.
- Pick a well-ventilated location that **children and pets cannot access**, preferably with a **lock**.
- Keep pesticides away from food, feed and flames.
- Choose a location away from ponds, streams and **drinking water** wells.

e. Safety

- Practice **Integrated Pest Management (IPM)** to reduce the need for pesticides.
- Try to keep your pesticide inventory as low as possible. Buy only what you need this season; mix only what you need today.
- **Dispose** of unwanted pesticides properly rather than storing them.
- Never store pesticides in **food or drink containers**.
- Consider storing bottles inside a larger container that could contain liquids in the event of a leak or **spill**. Keep sawdust or sand for spillage management.

f. Disposal of Pesticides.

Pesticides need to be disposed of properly to prevent accidents and to protect the **environment**. Unwanted pesticide products (waste) should be **stored safely** and disposed of as soon as possible.

- Dispose of pesticides as instructed on the **product label**. Look for the “**Storage and Disposal**” statement on your pesticide label.
- If any product remains in the container it must be disposed of as hazardous waste.
- Pesticides waste should be taken to county or national collection center or licensed disposal facility.
- After emptying a pesticide container triple rinse, it for disposal or recycling. Never reuse a pesticide container for any purpose!
- Be sure to wear protective clothing when rinsing pesticide containers, such as chemical resistant gloves and eye protection.
- Do not pour rinse water into any drain or on any site not listed on the product label; it could contaminate the **environment**.
- If you mixed or diluted a pesticide and you have a little too much left over, try to use it up while following the label.

Tips for transporting pesticides for disposal:

- Keep the pesticides in their original containers with the labels attached.
- Place containers so they won't shift and/or spill.
- Line the transport area in your vehicle or place pesticides in a plastic bin to contain any spills in case of an accident.
- If pesticides are carried in the back of an open vehicle, secure and cover the load.
- Don't put pesticides in the passenger compartment of a vehicle.
- Keep pesticides away from groceries, including food for animals.
- Go straight to the collection site once you have loaded your vehicle. Drive carefully!

Training for safe and effective of use of Pesticides

This includes the following but not limited to

- Pesticide purchase, transportation and storage
- Pesticide application (before and during) – considerations, Mixing and disposal of wastes
- Personal Protective Equipment (PPE) and Spraying (theory and practical)
- Classification and toxicity of pesticides
- PHIs, Residual levels, post-spray management and safety standards
- Pesticide's exposure and First aid measures
- The pesticides law - PCP Act, Cap 346
- Illegal/counterfeit pesticides and mitigation measures
- Pesticides label interpretation

The quality concerns in beans on pods include the presence of **regulated** and **quarantine** pests, pesticide residues, harmful organisms and non-compliance with technical standards. These challenges call for the development of alternative approaches in overcoming the phytosanitary and quality challenges in the export of beans and peas. One of these include Integrated Pest Management Practices (IPM) that incorporates non synthetic chemical options, such as diversified cropping systems, plant and microbial-based pesticides, varieties with multiple pest and disease resistance, insecticidal soaps, pheromones and kairomones, entomopathogens and predators. The approaches, coupled with capacity building and adhering to the set quality standards will improve compliance with export quality requirements for beans on pods.

The use of bio-pesticides has gained popularity since they do not leave harmful chemical residues on the produce, are renewable, less toxic to humans and non-target organisms, have no adverse effect on the environment, and are compatible with other strategies.

The use of resistant snap bean cultivars with desired export quality attributes is also a cost effective and sustainable approach.

Modification of the cropping system to manage pests also gives better results due to extra benefits accruing from the companion or intercrop crops. Modification of the cropping system encompasses growing bean together with another crop in the form of companion crops, intercropping, border crop and use of mulch. Companion crop and intercropping work by repelling the pests and favours the proliferation of natural enemies.

These different pest management options are combined in the development of Integrated Pest Management Programs (IPM) which aims at reducing synthetic pesticide sprays by integrating eco-friendly options, including bio-pesticides, seed dressers, manipulation of cropping systems, use of natural enemies, good agricultural practices and judicious use of safe pesticides. The approach focuses on early detection and prevention of pests before the buildup of their population.

IPM APPLICATION

The application of IPM is dependent on the farmer groups purely practicing Integrated Pest Management (IPM), through the use of plant protection products following the Technical guidance of a trained Agronomist.

Integrated Pest Management (IPM) involves the careful consideration of all available pest control techniques and the subsequent integration of appropriate measures that discourage the development of pest populations, and keeps plant protection products and other interventions to levels that are economically justified and reduce or minimize risks to human health and the environment.

The pest control strategy will involve an integrated approach which encompasses the principles of integrated pest management (IPM) and integrated crop management system (ICMS). Pest monitoring systems will be used to observe pest attack and predict potential infestation.

A biological and cultural pest and disease control method is preferred in first instance. Basic pest management principles will be applied by each farmer. Such include but are not limited to the following:

- i. Accurate identification of the pathogen
- ii. Crop scouting with determination of threshold levels
- iii. Predictive action on pests and disease control to diffuse potential problems and situations.

The result of the above IPM strategy will result in implementation of practical strategies in the area of:

- a. Prevention e.g. early land preparation for cutworms, resistant varieties, yellow sticky traps
- b. Observation and monitoring (Form 12) – Scouting - Pest and Disease Control)
- c. Intervention e.g. Specific IPM measures for false codling moth control.

INTEGRATED PEST MANAGEMENT SCOUTING IN BEAN ON PODS CROP

Scouting and monitoring are critical steps in pest management that allow managers to quantify pest pressure and the potential for crop damage. Information gathered in the scouting process can be used to determine if pest control measures are warranted, select appropriate control technologies and time them for maximum effect. Scouting in field crops may target insects, weeds, disease or even abiotic stresses not caused by pests. Regardless of the target in mind, a scout's primary goal should be regular, systematic monitoring of a crop that permits accurate and timely decision-making. Achieving this goal is dependent on adhering to the following four core practices:

1. Collect necessary background information.
2. Use the proper tools.
3. Be timely and use representative sampling methods.
4. Keep proper records

One of the most fundamental and challenging aspects of scouting is recognizing visual cues indicating something is damaging a crop and linking that damage to possible causes. For this reason, scouting must be based on prior knowledge of field conditions and management history, the crop being grown and common pest species. This information is frequently drawn from personal experience, but can also be accessed through the following resources:

- Local weather data.
- Soil survey maps.
- Aerial or satellite imagery.
- Farm management records.
- Crop and pest management reference materials.
- Extension Officers
- Private consultants and scouts.
- Farm input suppliers.
- Other farm managers.

RECORDKEEPING

Scouts should keep records of their scouting to indicate where exactly a problem was identified, how common the problem was, how damaging the problem was and what, if any, control measures were utilized. Including a field map in scouting records is a simple way to show scouting patterns and the location of identified issues. Keeping good records will improve the effectiveness of future scouting activities.

Whether using pesticide applications or an integrated crop management approach, it is important to understand what is happening with the crop. Scouting provides a formalized system for assessing the incidence of pests and diseases within the growing crop.

Scouting should include assessment for both the presence of pests and diseases, and that of beneficial insects.

Scouting must be done prior to making a decision to apply a pesticide (Form 12). Should it be determined that a pesticide application is necessary, then both the reason and recommendation for pesticide use must be recorded. In addition, should it be decided to use a preventative spray, e.g. because of weather conditions, disease pressure in adjacent blocks, etc., then this must also be documented in (Form 12).

Recommendations to apply plant protection products on the crop will then be based on knowledge of the crop, the scouting results, prevailing or anticipated weather conditions and Integrated Crop Management possibilities.

SCOUTING METHOD

The farmer group shall demonstrate implementation of at least two methods of each of the main IPM activity i.e. preventive, scouting and intervention measures.

To collect representative information and make the most out of time spent scouting, it is recommended scouts consider the basic procedures outlined below:

- Scouting should begin as soon as plants begin to grow or pests become active and should continue until the crop is harvested or the risk of pest pressure has passed.
- Scouting fields weekly is recommended. If degree day tools or biological information is available to predict the emergence or arrival of certain pests, use them to gauge when you might scout more intensively.
- Section fields into manageable portions based on location, size, and bean variety and scout them separately.
- Walk a path in the field that allows you to assess the crop broadly. Common approaches are walking in an X or a W pattern to cover the whole field. Walk a different pattern each time you scout, but also remember to re-examine hotspots where you have previously encountered high pest pressure.
- Within a broad scouting pattern, select five widely spaced points and at each point check a minimum of 10 plants and 100 square feet of surrounding ground for signs and symptoms of pest pressure or abiotic stress. Examine all parts of crop plants including leaves, stems, roots and reproductive portions.
- Determine the distribution of issues encountered. Is the problem scattered randomly throughout the field or occurring in a recognizable pattern that could be attributed to a particular pest species or past management operation?
- Attempt to identify any signs or symptoms of pests encountered in scouting. Consult reference materials and pest management professionals for assistance. Once an issue is identified, use information regarding its abundance or damage to the crop to make control decisions.

SCOUTING FOR INSECT PESTS, DISEASES AND WEEDS IN BEANS ON PODS

1. Insects

Aphids: Weekly field checks after planting, check hot spots along the margins, use traps to determine flight activity.

Thrips: Weekly field checks to observe population dynamics, sample 5 plants/leaves or flowers and bag to count the numbers.

Whiteflies: Weekly checks, use sticky traps, inspect leaves underneath and estimate nymph numbers

2. Diseases

Blight/Virus Diseases

- Weekly check in the field, mark 5-10 randomly selected plants per location and estimate the disease progression. Use a scale (1-9) based on the percent area of leaf/plant affected to estimate and record the disease or the increase in infection within the field (severity)
- You can also uproot plants (destructive sampling) and carry to lab and process the roots to count the numbers

3. Weeds

- Every two weeks or predetermined time periods, using a quadrat of unknown measurements, one is able to count the number of weeds in the area and the species within identified, the plants can be dried and preserved for identification if unknown
- The quadrats are thrown in random locations to get representative samples for the field

PLANT PROTECTION PRODUCTS

Use of plant protection products shall be recommended by trained and competent Technical Advisors.

Just in case the producer group decides to use plant protection products, the group will first approve the list of plant protection products (PPP) that can be used on the crop (based on PCPB recommendations), put in place storage facilities for the PPP that meets sanitary and phytosanitary requirements, Train the spray operators, and put in place the requirements pertaining PPP approval before use, label recommendations, stock inventory, mixing procedures, PPE use and storage, spray equipment use and storage, disposal of empty PPP containers, disposal of surplus spray mix and spray equipment tank washings, records, and any other requirement required by the Global GAP standard.

The justification for pesticide use will be recorded in the scouting form i.e. Form 12. The records of PPP application will be kept in Form 20.

1.3. HEALTH AND SAFE WORKING CONDITIONS RISK ASSESSMENT FORM

PRODUCT

TYPE OF PRODUCT

FARM ACTIVITIES

KEY

Hazard identification: **C** - Chemical food contamination, **P** - Physical food Hazard, **M** - Microbial food Hazard, **B** - Biological Hazard, **E** - Environmental Hazard

Hazard probability

1 - Theoretic and not likely, 2- Has already occurred in the past. This can reccur, 3 - Risk occurs regularly, 4 - occurs regularly to always

Hazard Severity: 1 - Minimal, 2 - Low, 3 - Moderate, 4 - Significant

Hazard characterization: 1 to 4 - No known effect, 5 to 8 - Limited effect (short term), 9 to 12 - Effect is more or less serious but reversible, 13 - 16 - Irreversible damages (Fatal)

ACTIVITY/SOURCE OF HAZARD	HAZARD IDENTIFICATION (TYPE)	HAZARD PROBABILITY	HAZARD SEVERITY	HAZARD CHARACTERIZATION	POPULATIONS EXPOSED	MITIGATING MEASURES	CORRECTIVE ACTION (ROOT CAUSE ANALYSIS & ACTION PLAN)	INFORMATION & DOCUMENTS	RESPONSIBILITY

CONCLUSIONS

ASSESSMENT DONE BY DATE

OPERATOR ORGANIZATION NAME EFFECTIVE DATE

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1.4. VISITORS PERSONAL HYGIENE AND SAFETY INSTRUCTIONS

1. All visitors shall first report to the office.
2. All visitors must wash their hands with soap and water, or sanitize their hands upon arrival at the farm, and just before leaving the farm/office
3. Visitors with mobile phones and laptops should sanitize them before and after using them at our premises
4. Visitors should leave their personal effects at the place directed by the management
5. While at the farm, all visitors shall be accompanied by key staff.
6. While at the farm wear a mask or cloth nose/mouth covering at all times
7. Avoid physical contact with the people around you and do not shake hands
8. No unauthorized entry into the restricted areas e.g. stores, produce sheds, e.t.c.
9. No entry into areas with red flags
10. Wearing jewellery and heavy perfume is not permitted in produce harvesting areas and produce sheds.
11. Immediately report any form of accident to the management personnel accompanying you for help.
12. Spillage of bodily fluid within the fields being harvested and while in our produce sheds is treated as a food safety incident.
13. After visiting the toilet, wash your hands with clean water and soap provided.
14. Smoking, chewing of khart, or tobacco, eating and drinking is strictly not allowed in the farm except in the designated areas.
15. Pets are not allowed in the planted blocks and produce sheds.
16. Litter must be deposited in litter bins (where provided) or in the waste disposal pits.
17. No handling of crops, produce, tools, equipment unless authorized.
18. Visitors must not enter restricted areas, unless accompanied by management.
19. Unauthorized planting materials and agricultural pesticides are not allowed into the farm compound without prior arrangement with management.
20. Informative notices are displayed in the notice boards, our farms & at our facilities.

HEALTH QUESTIONNAIRE

QUESTION	YES	NO
Do you have a mask or cloth mouth and nose covering with you?		
Are you suffering from infectious /communicable diseases, boils or skin diseases?		
Are you experiencing any COVID-19 disease symptoms? i.e. High fever, running nose, flu, sore throat, pneumonia symptoms, difficulty in breathing e.t.c		
Have you been in contact with a known case of COVID-19 in the past 14 days		
Which counties have you been to in the past 3 months?		
Have you visited other countries in the past 3 months? If yes, name them?		

The visitor, has confirmed that, to the best of his/her knowledge, he/she has not been in contact with a known case of COVID-19 in the past 14 days. The visitor commits to adhering to the group/farm's health and safety procedures.

If he/she tests positive for COVID-19 within the next 14 days, he/she will notify the operator group through the chairman.

GROUP MANAGEMENT SIGNATURE

NAME DATE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

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1.5. SAFETY INSTRUCTIONS

1. It is the responsibility of every individual worker, visitor, and contractor to carry out their duties in the farm in a safe manner and avoid putting themselves and others at risk.
2. All hazards, dangerous occurrences, or accidents should be immediately reported to the nearest first aid worker, supervisor, or any member of the management and recorded in the accidents form.
3. Caution to be exercised when using farming equipment such as jembes, hoes, slashers, pangas, and other farm implements in order to avoid injuries and accidents.
4. All personal belongings should be kept in the designated areas and not taken to cropped areas and produce holding sheds.
5. Where applicable, protective clothing must be worn by all without exception e.g. when working with pesticides, and any other work where such instructions are given.
6. Due precaution according to manufacturer's/operational guidelines shall be taken when working with dangerous or complex equipments e.g, electric equipment and appliances, water pumps etc
7. Accident and emergency instructions on how to act in accident and emergency situations shall be communicated to all workers and visitors.
8. Read notice boards where provided for information and instructions.
9. In case of fire outbreak, follow the procedures as you have been briefed. Refer to the notice board.
10. Fields sprayed with pesticides shall be marked with red flags (No entry) and Yellow flags (No harvesting).
11. After visiting the toilet, wash your hands with clean water and soap provided.
12. All the visitors shall be required to provide the management with information to complete the health questionnaire and receive briefing on safety measures.
13. Personnel and anybody visiting the farm shall be made aware of the main routes, and all restricted areas.

I have read/ I have been trained, I have understood the above, and will comply with these conditions always while on the farm.

SIGNATURE

NAME DATE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

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1.6. HYGIENE RULES

The following hygiene rules shall apply to workers, sub-contractors, and visitors on the farm who are likely to come close to the edible portion of the crop and especially those in harvesting and at the produce sheds.

1. Hands must be washed prior to commencing work and after every visit to the toilets and all breaks (including meals, toilet breaks etc).
2. No jewellery is permitted at the blocks being harvested and produce sheds with the exception of a plain wedding ring. In case the plain wedding ring is lost within the farm, you must immediately report to the nearby person in charge. Perfume is also not permitted.
3. Sprayed fields shall be marked with red or yellow flags. Do not harvest in those blocks.
4. Hair must be covered when one is harvesting, transporting produce, and while at the produce sheds. Those without hair are not required to wear headgear.
5. Nails must be kept short and clean at all times. No nails vanish should be worn.
6. Personal hygiene inspection shall be done by the hygiene supervisor before you are allowed to come into contact with produce. Also adhere to the COVID-19 disease prevention and reporting measures stated in the health and safety rules.
7. All personnel should always be in the right work clothes and where applicable, the right personal protective clothing.
8. All personnel should ensure that foreign matter does not come into contact with harvested food product.
9. No food and/or drinks should be brought or consumed within the harvesting environment.
10. Smoking is not permitted in any area on the farm except in the designated area.
11. Report illness, cuts, lesions and bleeding immediately to your immediate supervisor or farm in-charge. Report accidents to the first aider on duty.
12. Any one suffering from gastro-intestinal illness, sores, or boils to the hands and face, skin infections and heavy colds shall be excluded from crop handling areas immediately and if possible allocated other duties. Any open wound must be covered by a suitable plaster. One with a plastered wound on the hand can only handle product while wearing surgical gloves.
13. Harvest containers shall be exclusively used for harvesting.
14. Glass and clear hard plastics shall not be taken into the cropping blocks.
15. Ensure that the harvest equipment and transport vehicle/vessels is clean before use. During use, sanitize them regularly with non-perfumed food grade sanitizer.
16. All the harvesting equipment and on farm transport e.g. picking buckets, pickups, shall be cleaned and sanitized at the end of each working day.

17. After harvesting, all picking equipment, produce road side sheds, shall be cleaned hygienically and rubbish collected.
18. Sufficient waste bins/ waste disposal pits shall be provided at strategic locations within the farm to have all litter collected/dropped in. Dropping of litter anyhow and anywhere is not allowed.
19. Follow hand washing and sanitizing instructions.

I have read/ I have been trained, I have understood the above hygiene requirements, and will comply with these conditions always while on the farm.

SIGNATURE

NAME DATE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

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1.7. INPUTS SUPPLIER AUDIT CHECKLIST

TYPE OF FARM INPUT

INPUT DESCRIPTION

SUPPLIER NAME

SUPPLIER ADDRESS

SUPPLIER LOCATION

CONTACT PERSON MOBILE CONTACT

CRITERIA	YES/ NO	ACTION (WHERE APPLICABLE)	REMARKS
1 Good reputation			
2 Valid dealers license by government appointed authority			
3 Legal input manufacturer and technical capability			
4 Quality of the input acceptable			
5 Good packaging and presentation			
6 Product labeling (Traceability details, product description)			
7 Relevant documents accompanying sold input			
8 Upkeep of input supplier storage premises			
9 Input quality assurance (Guarantee)			
10 Input transportation that meets food safety requirements			

SUPPLIER APPROVED?

SIGNATURE

NAME OF INSPECTOR DATE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

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1.8. FARM/SITE - FERTILIZER RISK ASSESSMENT FORM

PRODUCT TYPE OF PRODUCT

Responsibility: Farmer

Product can be Cross-contaminated or contaminated through contact with air, facilities, ground, personnel, and equipment.

This form shall be completed every 12 months and when the source of organic manure is changed.

SOURCE

TYPE

SOURCE CONTENTS

Product can be cross contaminated or contaminated through contact with air, facilities, ground, personnel and equipment.

KEY

Hazard identification: *Chemical food contamination (C), Physical food contamination (P), Microbial food contamination (M), Biological contamination (C)*

Hazard probability

1 – Theoretic and not likely, 2 - Has already occurred in the past. This can reccur, 3 – Risk occurs regularly, 4 – occurs regularly to always

Hazard Severity: *1 – Minimal, 2- Low, 3 - Moderate, 4 – Significant*

Hazard characterization: *1 to 4 – No known effect, 5 to 8- Limited effect (short term), 9 to 12 – Effect is more or less serious but reversible, 13 - 16 – Irreversible damages (Fatal)*

NO.	ACTIVITY/HAZARD SOURCE	HAZARD IDENTIFICATION	HAZARD PROBABILITY	HAZARD SEVERITY	HAZARD CHARACTERIZATION	POPULATIONS EXPOSED	MITIGATING MEASURES	CORRECTIVE ACTION	DOCUMENTS
1	Disease transmission potential (source, need for plant disease test).								
2	Weed seed content potential (need germination test?).								
3	Method of composting								
4	Heavy metal contents (Elements above WHO standards)								
5	Type of organic fertilizer. Cattle feed chemical contents.								
5	Other potential contaminants (e.g. Harmful bacteria)								
6	Timing of application								
7	Placement of organic fertilizer (e.g. direct contact with edible part of crop)								

LABORATORY RESULTS - CONCLUSIONS

RISK ASSESSMENT BY DATE

SIGNATURE

FARMER DATE

1.11. FERTILIZER APPLICATION RECORD

FARM NAME LOCATION

BLOCK NO AREA (HA) CROP

VARIETY PLANTING DATE

a. Summary of Soil Fertilizer/manure Application

DATE OF APPLICATION	TRADE NAME (TYPE) OF FERTILIZER/MANURE	NPK COMPOSITION	RATE PER HECTARE	QUANTITY APPLIED	MODE OF APPLICATION	MACHINERY USED	OPERATOR'S NAME (S)	ADVISED BY NAME/ SIGN

NOTES

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

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1.12. ENVIRONMENTAL ISSUES AFFECTING THE USE OF WATER RISK ASSESSMENT FORM

PRODUCT

TYPE OF PRODUCT

WATER USE ACTIVITIES: Irrigation, washing and Plant protection product mixing

KEY

Hazard identification: **C** - Chemical food contamination, **P** - Physical food Hazard, **M** - Microbial food Hazard, **B** - Biological Hazard, **E** - Environmental Hazard

Hazard probability

1 – Theoretic and not likely, **2** - Has already occurred in the past. This can reccur, **3** – Risk occurs regularly, **4** – occurs regularly to always

Hazard Severity: **1** – Minimal, **2** - Low, **3** - Moderate, **4** – Significant

Hazard characterization: **1 to 4** – No known effect, **5 to 8** - Limited effect (short term), **9 to 12** – Effect is more or less serious but reversible, **13 - 16** – Irreversible damages (Fatal)

NO.	ACTIVITY/SOURCE OF HAZARD	HAZARD IDENTIFICATION (TYPE)	HAZARD PROBABILITY	HAZARD SEVERITY	HAZARD CHARACTERIZATION	POPULATIONS EXPOSED	MITIGATING MEASURES	CORRECTIVE ACTION (ROOT CAUSE ANALYSIS & ACTION PLAN)	INFORMATION & DOCUMENTS	RESPONSIBILITY

CONCLUSION

RISK ASSESSMENT BY DATE

1.13. PRODUCT RECALL, WITHDRAWAL AND RECONCILIATION RECORD

1. Product recall details *(To be completed by pack house/Quality Assurance manager)*

DATE AND TIME INFORMATION IS RECEIVED	PARTICULARS OF THE PRODUCT AND REASON FOR WITHDRAWAL	QUANTITY (NO OF CRATES, KGS)	TRACEABILITY DETAILS

2. Stock reconciliation *(To be completed by Pack house Quality Supervisor)*

DATE AND TIME OF RECEIVING INFORMATION	QUANTITY RECEIVED (NO OF CRATES, KGS)	QUANTITY RECALLED (NO OF CRATES, KGS)	ACTION TAKEN	QUANTITY TO BE ACCEPTED (NO OF CRATES, KGS)	QUANTITY ACCEPTED DATE AND TIME	QUALITY CONTROLLER NAME

COMMENT BY PACK HOUSE

PACK HOUSE MANAGER SIGN DATE

COMMENT BY TECHNICAL ADVISOR

TECHNICAL ADVISOR NAME SIGN DATE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

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1.14. PEST AND DISEASE MONITORING RECORD

FARM SCOUTING REF. NO.
 BLOCK REF SIZE HA PLANTING DATE
 CROP VARIETY AGE

PEST & DISEASES	APHIDS	BEAN FLY	BOLLWORM/ CATERPILLARS	FRUIT FLY	LEAF MINERS	FALSE CODLING MOTH	THRIPS	WHITE FLIES	ANTHRACNOSE	ASCHOCHYTA	BACTERIAL INFECTIONS	BLIGHT	MILDEWS	RUST	LEAF SPOTS	OTHERS
THRESHOLD LEVELS (OUT OF 10)	3	1	1	1	1	1	2	1	2	2	1	2	2	1	2	3

NUMBER OF PLANTS AFFECTED (OUT OF 10) PER EACH SCOUTING STATION

PEST, DISEASE, BENEFICIAL INSECTS	1	2	3	4	5	6	7	8	9	10	AVERAGE /10	RECOMMENDATIONS: SPRAY <input type="checkbox"/> NO SPRAY <input type="checkbox"/>
												TRADE NAME
												Pesticide Dosage/Rate
												Quantity of pesticide
												Amount of water
												Equipment Serial
												Technique/Mode:
												Pressure
												Spray operator speed
												Equipment Operator (s)
												Date of Application:
												Time
												Recommended by
												Sign Date

SIGNED BY SCOUT DATE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

DOCUMENT NO.	ISSUE NO.	REVISION NO.	REVISION DATE	ISSUE DATE	SUPERSEDES	REASON FOR REVIEW	PAGE	APPROVED BY
FIELD/FS/ QMSR/1	001	000			Previous	New edition	1 of 1	Board of Management

1.17. FOOD SAFETY INCIDENTS RECORD

FARM

NO	DATE	CONTAMINANT	INCIDENT DETAILS	ROOT CAUSE	CORRECTIVE ACTION	PREVENTIVE ACTION	ACTION VERIFIED	DATE OF VERIFICATION	CHECKED BY
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

NAME OF OPERATOR ORGANIZATION: FIELD FOOD SAFETY QMS MANUAL

EFFECTIVE DATE

DOCUMENT NO.	ISSUE NO.	REVISION NO.	REVISION DATE	ISSUE DATE	SUPERSEDES	REASON FOR REVIEW	PAGE	APPROVED BY
FIELD/FS/QMSR/1	001	000			Previous	New edition	1 of 1	Board of Management

1.19. HARVEST RECORD

SUB STATION/PRODUCE SHED

HARVEST DATE PRODUCT/VARIETY

NO	NAME OF OPERATOR	OPERATOR CODE	HARVESTED BLOCK(S) CODE	PRODUCE COLLECTION NOTE NO.	DISPATCHED (KG)	PRODUCE/ GRADE
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						

16								
17								
18								
19								
20								
21								
22								
23								
24								
25								
26								
27								
28								

NOTES WHERE APPLICABLE

CUSTOMER VEHICLE REGISTRATION NO. GRADER

GROUP HARVEST SUPERVISOR SIGNATURE

NAME OF OPERATOR ORGANIZATION EFFECTIVE DATE

REF	ISSUE NO.	REVISION	REVISION DATE	ISSUE DATE	SUPERSEDES	REASON FOR REVIEW	PAGE	APPROVED BY
FIELD QMS FORM	001	000			Previous	New edition	1 of 2	Board of Management

1.22. MRLS COMPLIANCE RISK ASSESSMENT AND SAMPLING FORM

CROPS COUNTRIES OF SALE

PRODUCT TYPE

FARM LOCATION

RISK LEVEL CROP LIFE CYCLE

KEY

Hazard identification: *Chemical food contamination - C, Physical food contamination - P, Microbial food contamination - M, Biological food contamination - B*

Hazard probability

1 – Theoretic and not likely, 2 - Has already occurred in the past. This can reccur, 3 – Risk occurs regularly, 4 – occurs regularly to always

Hazard Severity: *1 – Minimal, 2 - Low, 3 - Moderate, 4 – Significant*

Hazard characterization: *1 to 4 – No known effect, 5 to 8 - Limited effect (short term), 9 to 12 – Effect is more or less serious but reversible, 13 - 16 – Irreversible damages (Fatal)*

FACTORS ASSESSED

3. Crop surface production area: Ha
4. Weekly production volume: Tonnes
5. No. of producers:
6. No. of production Blocks: Blocks
7. Location of blocks: Within km radius
8. Good agricultural practices (GAPs):
9. IPM Techniques:
10. Pests/disease pressure:
11. List of approved plant protection products:
12. Intensity of pesticide use:
13. Current EU MRLS for the products:

NO.	ACTIVITY/SOURCE OF HAZARD	HAZARD IDENTIFICATION (TYPE)	HAZARD PROBABILITY	HAZARD SEVERITY	HAZARD CHARACTERIZATION	POPULATIONS EXPOSED	MITIGATING ALTERNATIVES	CORRECTIVE ACTION (ROOT CAUSE ANALYSIS & ACTION PLAN)	INFORMATION & DOCUMENTS
1									
2									

PRODUCE PESTICIDE RESIDUE ANALYSIS NEEDED OR NOT?

The sampling shall be done based on the above recommendation and the following sampling plan.

PRODUCE PESTICIDE RESIDUE SAMPLING PLAN	
1	When to take samples - Most risky periods
2	Where to take the samples:
3	Sampling point(s)
4	Nature of samples to be analyzed
5	No. of samples to be analyzed
6	Type of analysis
7	Active ingredients used that are not covered by the analysis
8	Sample weight
9	Sampling frequency
10	Sampling method
11	MRL exceedance action plan
12	Corrective Action

CONCLUSIONS

RISK ASSESSMENT BY DATE

FARM MANAGER SIGNATURE DATE

1.25. LABORATORY SERVICE CAPABILITY FOR BEANS AND PEAS

(For more information on laboratory service providers, please log onto <https://www.kenas.go.ke>)

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
Name: KEPHIS Analytical Chemistry Laboratory and Food Safety, Oloolua Ridge, Karen Name of contact person: Prof. Theophilus M. Mutui (PhD) Email Address: director@kephis.org	Soil Nutrient testing	NPK and trace elements	10 working days
	Soil pH and EC	pH and EC	10 working days
	Soil suitability testing	Soil recommendations done based on soil fertility profile and crop to be planted	
	Soil pathology analysis	<i>Verticillium</i> spp, <i>Ralstonia</i> , <i>Pythium</i> , <i>Alternaria</i> spp., <i>Fusarium</i> spp, <i>Rhizoctonia</i> spp, <i>Phytophthora</i> spp	
	Leaf tissue testing	Trace elements e.g copper, iron, zinc	10 working days
	Irrigation water quality	PH, EC anions and cations Compute SAR	10 working days
	Irrigation water pathology analysis		
	Packhouse water	Microbial pathogens	10 working days
	Drinking water WHO Guidelines for Drinking-Water Quality, 2008	XX	XX
	Heavy metals	20 elements	10 working days
	MRLs GC-MS	140 pesticides	10 working days
	MRLs LC-MS	160 pesticides	10 working days
	Plant health diagnostics		
	Pathology		
	Entomology		
Virology			

Name: POLUCON SERVICES KENYA LIMITED
 Name of contact person: CHARLES MAINA MUTIGA
 Location: POLUCON HOUSE, NYATI ROAD OFF LINKS ROAD, MOMBASA, SAMEER INDUSTRIAL PARK,
 UNIT 2A, ROAD C INDUSTRIAL AREA NAIROBI
 Email Address: polucon@polucon.com laboratory@polucon.com

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
	Soil Nutrient testing	Phosphorous, Potassium, Calcium, Magnesium, Sodium, Iron, Manganese, Aluminium, Copper, Boron, Zinc, Ca:Mg, %Organic Matter,	4-5 working days
	Soil PH and EC	pH value and ELECTRICAL CONDUCTIVITY (EC)	1-3 working days
	Soil suitability testing	ARSENIC AS As, BORON AS B, CADMIUM AS Cd, COBALT AS Co, CHROMIUM, COPPER AS Cu, MERCURY AS Hg, LEAD AS Pb, NICKEL AS Ni, SELENIUM AS Se, ZINC AS Zn	4-5 working days
	Soil pathology analysis	<i>Verticillium spp, Ralstonia, Pythium, Alternaria spp., Fusarium spp, Rhizoctonia spp, Phytophthora spp-</i> No capability	
	Leaf tissue testing	SODIUM AS Na, PHOSPHOROUS AS P, POTASSIUM AS K, CALCIUM AS Ca, MAGNESIUM AS Mg, IRON AS Fe, ZINC AS Zn, MANGANESE AS Mn, COPPER AS Cu, BORON AS B, MOLYBDENUM AS Mo, SODIUM AS Na	4-5 working days
	Irrigation water quality		3-5 working days
	Packhouse water	Physical, Chemical & Microbiological tests	5-6 working days
	Drinking water WHO Guidelines for Drinking-Water Quality, 2008	Physical, Chemical & Microbiological tests	5-6 working days
	Heavy metals	Arsenic, Cadmium, Lead, Copper, Manganese, Chromium, Selenium, Molybdenum, Nickel & Mercury	3-5 working days
	MRLs GC-MS	Organochlorines, Organophosphates and carbamates screening	24 hours (Express) 2-4 working days
	MRLs LC-MS	xxxx	
	Fruit quality testing		
	Plant health diagnostics	No capability	
	Pathology	No capability	
	Entomology	No capability	
	Virology	No capability	

Bureau Veritas Kenya Limited
 Name of contact person: ...Edwin Githire Senengo
 Location: Mombasa.
 Email: edwin.senengo@bureauveritas.com

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
	Soil Nutrient testing	pH, EC (Salts), Phosphorus, Potassium, Calcium, Magnesium, Sulphur, Sodium, Iron, Manganese, Boron, Copper, Zinc, C.E.C, Total Nitrogen, Organic Matter, C/N ratio	7 Days
	Soil PH and EC	pH and EC	1 Day
	Soil suitability testing		
	Soil pathology analysis	<i>Verticillium</i> spp, <i>Ralstonia</i> , <i>Pythium</i> , <i>Alternaria</i> spp., <i>Fusarium</i> spp, <i>Rhizoctonia</i> spp, <i>Phytophthora</i> spp	Subcontracted BV Dubai Lab (14 Days)
	Leaf tissue testing	<i>Ralstonia</i> , <i>Pythium</i> , <i>Rhizoctonia</i> spp, <i>Fusarium</i> spp, <i>Botrytis cineria</i> , <i>Colletotrichum</i> spp, <i>Phytophthora</i> spp, <i>Verticillium</i> spp, <i>Alternaria</i> spp.	Subcontracted BV Dubai Lab (14 Days)
	Irrigation water quality	pH, Electrical Conductivity, Ammonium, Calcium, Magnesium, Potassium, Phosphorus, Nitrate N, Nitrates, Sulphur, Sulphate, Iron, Manganese, Zinc, Boron, Copper, Molybdenum, Sodium, Chlorides, Bicarbonate, Silicon, Silica, SAR, Hardness, Turbidity,	5 Days
	Irrigation water pathology analysis	<i>Alternaria</i> spp., <i>Ralstonia</i> , <i>Pythium</i> , <i>Rhizoctonia</i> spp, <i>Fusarium</i> spp, <i>Verticillium</i> spp, <i>Phytophthora</i> spp	Subcontracted BV Dubai Lab (14 Days)
	Pack house water	pH, Electrical Conductivity, Ammonium, Calcium, Magnesium, Potassium, Phosphorus, Nitrate N, Nitrates, Sulphur, Sulphate, Iron, Manganese, Zinc, Boron, Copper, Molybdenum, Sodium, Chlorides, Bicarbonate, Silicon, Silica, SAR, Hardness, Turbidity, Total Coliforms, Faecal <i>E. Coli</i> , Total Viable Count @37, <i>Pseudomonas aeruginosa</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus faecalis</i> , Sulphite reducing anaerobes, <i>Shigella</i> , <i>Salmonella</i> sp	5 Days
	Drinking water WHO Guidelines for Drinking-Water Quality, 2008	pH, Electrical Conductivity, Ammonium, Calcium, Magnesium, Potassium, Phosphorus, Nitrate N, Nitrates, Sulphur, Sulphate, Iron, Manganese, Zinc, Boron, Copper, Molybdenum, Sodium, Chlorides, Bicarbonate, Silicon, Silica, SAR, Hardness, Turbidity, Total Coliforms, Faecal <i>E. Coli</i> , Total Viable Count @37, <i>Pseudomonas aeruginosa</i> , <i>Staphylococcus aureus</i> , <i>Streptococcus faecalis</i> , Sulphite reducing anaerobes, <i>Shigella</i> , <i>Salmonella</i> sp	5 Days
	Heavy metals	Lead, Mercury, Arsenic, Cadmium Nickel, Chromium, Cobalt	14 Days

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
	MRLs GC-MSMS	Pesticide Residue Screening (>400 Analytes)	14 Days (BV Dubai)
	MRLs LC-MSMS	Pesticide Residue Screening (>400 Analytes)	14 Days (BV Dubai)
	Plant health diagnostics	No capability	
	Pathology	No capability	
	Entomology	No capability	
	Virology	No capability	
UoN, CAVs LARMAT Department	Soil Nutrient testing	Capability available	1-2 weeks
	Soil PH and EC	Capability available	1-2 weeks
	Soil suitability testing	Capability available	1-2 weeks
	Soil pathology analysis	<i>Verticillium spp, Ralstonia, Pythium, Alternaria spp., Fusarium spp, Rhizoctonia spp, Phytophthora spp</i>	
	Leaf tissue testing	N/a	
	Irrigation water quality	Capability available	1-2 weeks
	Irrigation water pathology analysis	Identification of pests presence, their abundance, virulence and severity of damage	1-4 weeks
	Packhouse water		
UoN, Chiromo	Drinking water WHO Guidelines for Drinking-Water Quality, 2008	Coliform group, minerals and pH	1-4 weeks
	Heavy metals	Identification of the elements present and the quantities in collaboration with Chemistry laboratory in Chiromo (UoN)	1-4 weeks

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
UNIVERSITY OF Nairobi, College of Agriculture and Veterinary Services, Crop Protection department and Food Science, Nutrition and Dietetics, Public health, Phamacology and Toxicology	MRLs GC-MSMS	Pesticide Residue Screening	1-4 weeks
	MRLs LC-MSMS	No capability	
	Plant health Diagnostic services		
	Pathology	Direct microscopic examination of the samples/isolates, PCR method Bacterial basic PCR for direct methods of detection	1-4 weeks
	Entomology	Examining the damages, morphological characteristics, using reference specimen and basic PCR	1-4 weeks
	Virology	Use of diagnostic plants, serology and basic PCR	1-4 weeks
KALRO KABETE P.O.Box 14733 00800 Nairobi			
KALRO Soil Chemistry Laboratory, KALRO, FCRC Kabete Location: Waiyaki Way, Nairobi Name of contact person: N. G. Gachini Email Address: soil.labs@kalro.org	Soil Nutrient testing	Total N, Total Organic Carbon (TOC), P, K, Na, Ca, Mg, Mn, Cu, Fe, Zn	15 working days
	Soil PH and EC	pH & EC in 1:1 (w/v) soil – water suspension	2-3 working days
	Soil suitability testing	No capability	

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
Pathology Lab, KALRO NARL	Soil pathology analysis	<i>Verticillium</i> spp, <i>Ralstonia</i> , <i>Pythium</i> , <i>Alternaria</i> spp., <i>Fusarium</i> spp, <i>Rhizoctonia</i> spp, <i>Phytophthora</i> spp, Soilborne bacterial pathogens; Plant parasitic nematodes	10 working days
KALRO Soil Chemistry Laboratory	Leaf tissue testing	N, P, K, Ca, Mg, Mn, Cu, Fe, Zn	10 working days
Pathology Lab, KALRO NARL	Irrigation water quality	pH, EC, Na, K, Ca, Mg, Carbonates, Bicarbonates, Chlorides, Sulphates	5-8 working days
	Irrigation water pathology analysis	Bacteria and Fungal pathogens; Nematode pests	10 working days
	Pack house water		
	Drinking water WHO Guidelines for Drinking-Water Quality, 2008		
	Heavy metals		
	MRLs GC-MSMS		
	MRLs LC-MSMS		
Pathology Lab, KALRO NARL Location: KALRO KABETE PLANT PATHOLOGY SECTION; OFF WAIYAKI WAY NAIROBI Name of contact person: DR. RUTH AMATA Email: ruthlodenyi@gmail.com ...; ruth.amata@kalro.org	Pathology	Microscopic identification and characterization of plant pathogenic fungi Microscopic identification and quantification of plant parasitic nematodes Identification of plant pathogenic bacteria through use of selective media and ELISA	10 working days 10 working days 10 working days

LABORATORY CONTACTS	TEST REQUIRED	PARAMETER TESTED	TURNAROUND TIME
Entomology Lab, KALRO NARL Paddy Likhayo Location: Waiyaki Way Opposite ABC Place, Nairobi, Kenya Email: paddy.likhayo@kalro.org / paddy.likhayo@gmail.com	Entomology	Pest identification, pest damage, pesticide efficacy and persistence evaluation	One to six months
	Virology		





B2

MODEL
CERTIFICATES

PHYTOSANITARY CERTIFICATE



No 0577016		 KP20165770165KE	
 MINISTRY OF AGRICULTURE, LIVESTOCK AND FISHERIES KENYA PLANT HEALTH INSPECTORATE SERVICE (KEPHIS) PHYTOSANITARY CERTIFICATE Agricultural Produce (Export) Act Cap 319			
1. Name and address of exporter Tobacco Trading Co PO Box 999999999- 45754, Nairobi Kenya		2. PHYTOSANITARY CERTIFICATE No. KEPHIS/2015/1782016	
3. Declared name and address of consignee XXXXXXXXXXXX XXX, LXXXXXXXXXXXX Kenya		4. To Plant Protection Organization(s) of Switzerland (The Netherlands)	
5. Place of Origin Kenya		6. Declared means of conveyance By Sea, MY boat	
7. Declared point of entry XXXX (YYYYY)		8. Distinguishing marks XXXXXXXX	
9. Number and Description of packages: 2 Boxes of 10 KGS		10. Name of consignor None (Retail)	
11. Botanical name of plants Rosa spp., Solanum spp		12. Variety declared 100 stems, 1234 stems	
13. This is to certify that the plants and plant products described above Have been inspected according to appropriate procedures and considered to be free from quarantine pests and practically free from other injurious pests and that they are considered to conform to the current phytosanitary regulations of the importing			
14. Additional declaration "Consignment complies with Annex IV A.1 point 2 of EC Plant Health Directive 2000/29/EC as amended. Consignment complies with Annex IV A.1 point 45.2 option two of Annex IV of Plant Protection Ordinance (PPO 916.28) as amended. Consignment complies with Annex IV A.1 points 32.2 b & 45.2 b of EC plant Health Directive 2000/29/EC. Consignment complies with Annex IV A.1 points 32.2 option two & 45.2 option two of Annex IV of Plant Protection Ordinance (PPO 916.28) as amended."*			
15. Disinestation and/or disinfection treatment ****		place of issue Kephis Headquarters	
16. Chemical (active ingredient) ****		Date 15/04/2016	
17. Duration and temperature ****		Name of Inspector Test Inspector	
18. concentration 18. Date ****		Name of Authorized Officer Test Inspector	
20. Any additional information Ino No. XXXXXXXXy, BIO-XXXXXX		Signature of Authorized officer	



Official Stamp

Note: This certificate shall be completed in typescript or in block capitals
No financial liability with respect to this certificate shall attach to Kenya Plant Health Inspectorate Service or to any of its officers or representatives.

FORM A

1. Goods consigned from: (Exporter's business name, address, country)		Reference No. 449354			
2. Goods consigned to: (Consignee's name, address, country)		GENERALISED SYSTEM OF PREFERENCES CERTIFICATE OF ORIGIN (Combined declaration and certificate) FORM A			
		Issued in _____ (Country) See Notes overleaf			
3. Means of transport and route (as far as known)			4. For official use		
5. Item number	6. Marks and numbers of packages	7. Number and kind of packages; description of goods	8. Origin criteria (see Notes overleaf)	9. Gross weight or other quantity	10. Numbers and date of invoices
					
11. Certification It is hereby certified, on the basis of control carried out, that the declaration by the exporter is correct.			12. Declaration by the exporter The undersigned hereby declares that the above details and statements are correct; that all the goods were produced in _____ (Country)		
			and that they comply with the origin requirements specified for those goods in the Generalised System of Preferences for goods exported to _____ (Importing Country)		
(Place and date, signature and stamp of certifying authority)			(Place and date, signature of the authorised signatory)		

ANNEX

NOTES (2007)

I. Countries which accept Form A for the purpose of the generalized system of preferences (GSP)

Australia*	European Union		
Belarus	Austria	Finland	Netherlands
Canada	Belgium	France	Poland
Japan	Bulgaria	Hungary	Portugal
New Zealand**	Cyprus	Iceland	Romania
Norway	Czech Republic	Italy	Slovakia
Russian Federation	Denmark	Latvia	Slovenia
Switzerland including Liechtenstein***	Estonia	Lithuania	Spain
Turkey	Germany	Luxembourg	Sweden
United States of America***	Greece	Malta	United Kingdom

Full details of the conditions covering admission to the GSP in these countries are obtainable from the designated authorities in the exporting preference-receiving countries or from the customs authorities of the preference-giving countries listed above. An information note is also obtainable from the UNCTAD secretariat.

II. General conditions

To qualify for preference, products must:

- Fall within a description of products eligible for preference in the country of destination. The destination entered on the form must be sufficiently detailed to enable the products to be identified by the customs officer examining them.
- Comply with the rules of origin of the country of destination. Each article in a consignment must qualify separately in its own right, and
- Comply with the consignment conditions specified by the country of destination. In general, products must be consigned directly from the country of exportation to the country of destination, but most preference-giving countries accept passage through intermediate countries subject to certain conditions. (For Australia, direct consignment is not necessary.)

III. Entries to be made in box 8

Preference products must either be wholly obtained in accordance with the rules of the country of destination or sufficiently worked or processed to fulfil the requirement of that country's origin rules.

- Products wholly obtained for export to all countries listed in Section I, enter the letter "F" in box 8 (for Australia and New Zealand, Box 8 may be left blank).
- Products sufficiently worked or processed for export to the countries specified below, the entry in Box 8 should be as follows:
 - United States of America: for single country shipments, enter the letter "Y" in Box 8; for shipments from recognized associations of countries, enter letter "Z" followed by the sum of cost of value of the domestic materials and the direct cost of processing expressed as a percentage of the ex-factory price of the exported product (example: "Y" 25% or "Z" 35%).
 - Canada: for products which meet origin criteria from working or processing in more than one eligible least developed country, enter letter "G" in box 8; otherwise "F".
 - The European Union, Japan, Norway, Switzerland including Liechtenstein and Turkey: enter the letter "W" in Box 8 followed by the Harmonized Commodity Description and Coding System (harmonized System) heading at the four-digit level of the exported product (example: "W" 86.10).
 - Russian Federation: for products which include value added in the exporting preference-receiving country enter the letter "Y" in box 8, followed by the value of imported materials and components expressed as a percentage of the fob price of the exported products (example: "Y" 45%); for products obtained in a preference-receiving country and worked or processed in one or more other such countries, enter "FX".
 - Australia and New Zealand: completion of box 8 is not required. It is sufficient that a declaration be properly made in Box 12.

* For Australia the main requirement is the exporter's declaration on the normal commercial invoice. Form A, accompanied by the normal commercial invoice, is an acceptable alternative, but official certification is not required.

** Official certification is not required.

*** The principality of Liechtenstein forms, pursuant to the Treaty of 29 March 1923, a customs union with Switzerland.

**** The United States does not require GSP Form A. A declaration, setting forth all pertinent detailed information concerning the production or manufacture of the merchandise is considered sufficient only if required by the district officer of customs.



C

I

R

S

E

The background of the image consists of four black trays filled with fresh green beans, arranged in a 2x2 grid. The beans are vibrant green and appear to be freshly washed. The text is overlaid on the top-left and top-right trays.

**PART C:
EDUCATIONAL
TOOLS,
DOCUMENTATION
AND TRAINING
AVAILABLE**





C1

THE
BIBLIOGRAPHY
CONSULTED

1. A Business Guide for Addressing Food Loss & Waste in Smallholder Value Chains; Wageningen University and Research
2. Analysis of out-growers business model for canning French beans; The case of Meru Greens Horticulture, Kenya; By Anthony Mugambi Makona-September 2011
3. Commercial Snap Bean Production in Georgia; By the University of Georgia, Cooperative Extension-July 2013
4. Commercial varieties of French beans available in Kenya; By PIP Technical Itinerary French Beans
5. EU MRL changes for 83 PPPS IN 2021
6. Food loss in the French bean supply chain of VEGPRO-Group Kenya; By M.G. Kok, E. Osen, H. Snel - Wageningen University and Research
7. French beans, Kenyan origin. Field Notes; By Mathilde Fautras · Published 18/03/2009. Updated 31/03/2016
8. French Beans Production; By JICA, AFA- HCD, Ministry of Agriculture, Livestock and Fisheries
9. General Guidelines on Sampling CAC/GL 50-2004
10. Green beans value chain analysis in Kenya; Value Chain Analysis for Development (VA4D) No. 4 February 2018
11. Green Beans Value Chain in Kenya by Ulrich Kleigh, Claudine Basset-Mens, Catherine Allen, Andrew Edewa – February 2018
12. HCD Validated Data- 2017-2018 & 2018-2019
13. Integrated Pest Management Scouting in Field Crops-Michigan University Extension Bulletin E 3294
14. International Standards for Phytosanitary Measures. ISPM No.30: Methodologies for Sampling of Consignments
15. Inventory of Climate Smart Agriculture Garden Pea Technologies, Innovations & Management Practices; By KALRO under KCSAP
16. KS 1758-2:2016; Horticulture industry — Code of practice Part 2: Fruits and vegetables 2016-06-13
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18. Phytosanitary and Technical Quality Challenges in Export Fresh Vegetables and Strategies to Compliance with Market Requirements: Case of Smallholder Snap Beans in Kenya; By Alex M. Fulano, Geraldin M.W. Lengai, JamesW. Muthomi
19. Review of best postharvest practices for fresh market green beans, PEF White Paper 19-01, By Mohamed M. El-Mogy, Vegetable Crops Department, Faculty of Agriculture, Cairo University, Giza, Egypt & Lisa Kitinoja, The Postharvest Education Foundation (PEF), February 2019
20. Scouting for Insect Pests, Diseases and Weeds of Target Crops – Seed Enterprise Management Institute –University of Nairobi

21. Scouting Guide for IPM Field Walk- New Jersey Department of Agriculture, Tom Dorsey, 609-530-4192 or www.arbico-organics.com.
22. Self-Assessment Guide for French Beans and Snow Peas Sector
23. Standard for Mangosteens (CODEX STAN 204-1997). www.codexalimentarius.org
24. Standard for Quick Frozen Green Beans and Quick Frozen Wax Beans CXS 113-1981; Codex Alimentarius International Food Standards Adopted in 1981. Amended in 2019 www.codexalimentarius.org
25. Why Don't Small-Scale Operators Supply French Bean Export Markets in Kenya? By Stephanie Rosch, *Purdue University- January 2015*
26. https://www.incitecpivotfertilisers.com.au/~/_/media/Files/IPF/Documents/Agritopics/61%20Heavy%20Metals%20Agritopic.pdf
27. <http://extwprlegs1.fao.org/docs/pdf/mlw69902.pdf>
28. <https://www.cbi.eu/market-information/fresh-fruit-vegetables/beans-peas-other-leguminous-vegetables>





CS2

USEFUL
DOCUMENTATION
TO CONSULT



EUROPEAN COMMISSION PUBLICATIONS

1. The veterinary and phytosanitary system of the European Union explained - <https://op.europa.eu/en/publication-detail/-/publication/b70d1b20-499a-11e7-aea8-01aa75ed71a1/language-en/format-PDF/source-76151396>
2. Project Management Methodology Guide 3.0.1 <https://op.europa.eu/en/publication-detail/-/publication/b8458be2-821d-11eb-9ac9-01aa75ed71a1>
3. https://ec.europa.eu/food/plant/pesticides/eu-pesticides-database/mrls/index.cfm?event=details&pest_res_ids=213&product_ids=74,202&v=1

ITC PUBLICATIONS

1. The State of Sustainable Markets 2021 <https://digital.intracen.org/state-sustainable-markets-2021/state-of-sustainable-markets-2021/>
2. Sustainability Standards: A new deal to build forward better https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/T4SD%20publication_20211217_webpages.pdf ●
3. E-commerce at the Border Understanding customs and indirect taxes for United States and European Union markets https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/E-commerce%20at%20the%20Border_EN_FINAL_v2.pdf ●
4. The Business Guide for Sustainability in Foreign Investments https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/A4_PIGA_The%20Business%20Guide%20for%20Sustainability%20in%20Foreign%20Investments_2021_WEB.pdf ●
5. Kenya Sustainable Investment Requirements https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Kenya-Sustainable_FINAL.pdf ●
6. Invest in Kenya-Local Business Intelligence [https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/SMECO2020/SMECO_investment-Kenya_20210609_WEB\(1\).pdf](https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/SMECO2020/SMECO_investment-Kenya_20210609_WEB(1).pdf) ●
7. Linking Voluntary Standards to Sustainable Development Goals https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/Linking%20Voluntary%20Standards%20to%20Sustainable%20Development%20Goals_Final.pdf
8. The European Union Market For Sustainable Products The Retail Perspective On Sourcing Policies And Consumer Demand https://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/EU%20Market%20for%20Sustainable%20Products_Report_E_WEB.pdf ●

Ces liens ne fonctionnent pas





CE3

**AVAILABLE
TRAINING
COURSES**



1. Preservation, processing and packing of fruits and vegetables
<https://eservices.coleacp.org/en/e-bibliotheque/preservation-processing-and-packing-of-fruits-and-vegetables>
2. Information Management System for Official Controls “IMSOC”
https://ec.europa.eu/food/system/files/2019-10/comm_oc_20191003_pres3.pdf
3. Technical Itinerary for Peas
4. Principles of Hygiene and Food Safety Management
5. Traceability
6. Risk Analysis and Control in Production
7. Operator Safety and Good Crop Protection Practices
8. Regulations, Norms and Private Standards
9. Foundations of Crop Protection
10. Sustainable and Responsible Production
11. Biological Control
12. Ethical Production
13. Organic Fruit and Vegetable Production in ACP Countries
14. Social Responsibility



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APRIL 2023