Food and Agriculture Organization of the United Nations

International Plant Protection Convention

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Comité de Sanidad Vegetal del Cono Sur

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Promoting Systems Approach for Pest Risk Management to Strengthen Horticultural Sub-Sectors in Africa

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- Over the last twenty years, the continent has experienced multiple invasions by various pests of economic significance, jeopardizing food security and livelihoods.
- Crops such as avocado, mango, tomato, citrus, cereal, cotton, and banana are affected.
- A regional phytosanitary initiative is essential to provide member states with crucial information and practical solutions to combat these threats, safeguarding productivity, trade, and market access.





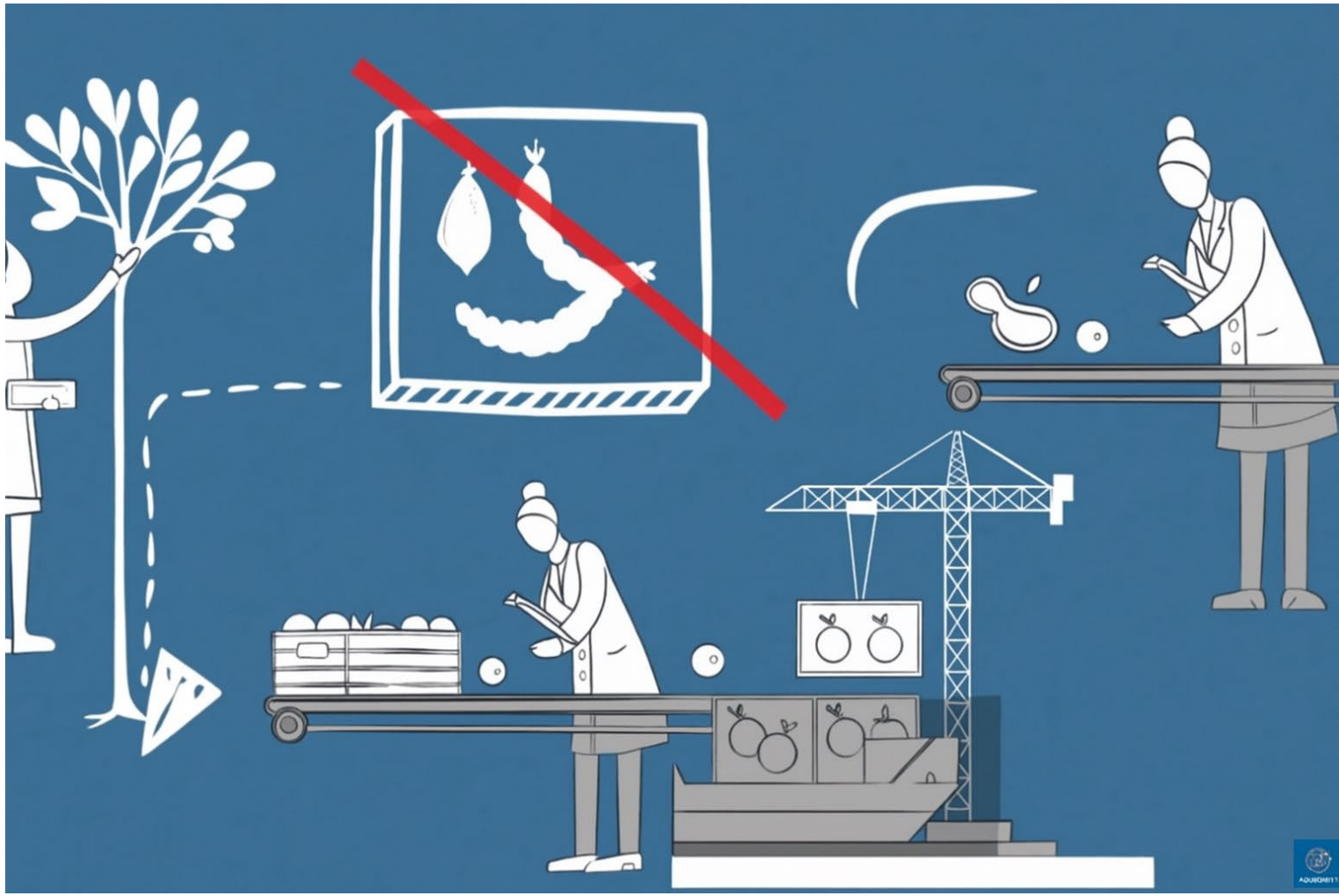

Over 40 priority pests have been listed by the 20 pilot countries. An analysis of these pests indicates that:

- The fruit fly problem is raised by 14 countries,
- The fall armyworm (11 countries),
- *Xylella fastidiosa* (8 countries),
- FCM (5 countries),
- Red Palm Weevil (4 countries),
- Citrus greening (4 countries),
- BBTV (4 countries).

Scientific Name	DZA	EGY	MAR	TUN	CVE	GNB	LBR	SLE	MLI	CMR	TCD	COG	COD	KEN	UGA	MWI	ZMB	ZWE	ZAF	#
fruit flies Bactrocera, dorsalis, zonata, frauenfeldi, Ceratitis	x	x	x	x	x	x	x	x	x		x	x			x	x		x		14
Spodoptera frugiperda	x		x	x	x	x			x	x	x	x	x	x						11
Xylella fastidiosa	x	x	x	x											x	x		x	x	8
Thaumatotibia leucotreta														x	x	x	x	x		5
Candidatus Liberibacter asiaticus																x	x	x	x	4
Rhynchophorus ferrugineus	x		x	x											x					4
Banana Bunchy Top Virus (BBTV)										x			x	x					x	3
Phthorimaea absoluta (Tuta absoluta)					x					x		x								3
Phytophthora palmivora												x	x						x	3
Achaea catocaloides							x			x										2
Amrasca devastans et *Amrasca biguttula*									x	x										2
Cassava Brown Streak Disease (CBSD)													x				x			2
Cassava Mosaic Virus (CMV)							x	x												2
Euwallacea fornicatus																x	x			2
Fusarium oxysporum f. sp. cubense (Foc)		x																	x	2
Ralstonia solanacearum			x														x			2
Rastrococcus spp.						x														2
Analeptes trifasciata Fabricius								x												1
Antigastra catalaunalis											x									1
Apate terebrans						x														1
Drosophila Suzuki															x					1
Bandeirenica caboverdus					x															1
Dactylopius coccus	x			x																1
Diaphorina citri																			x	1
Diastocera trifasciata						x														1
Distantiella theobroma								x												1
Eriococcus ironsidei																			x	1
Fusarium							x													1
Fusarium oxysporum f. sp. cubensis (TR4)														x						1
Gibberella xylarioides													x							1
Grasshopper									x											1
Heliochelus albipunctella											x									1
Maize lethal necrosis disease (MLND)														x						1
Nezara viridula					x															1
Paracoccus marginatus												x								1
Phyllosticta citricarpa		x																		1
Phylosticta leucotreta																		x		1
PVMV								x												1
Quelea-quelea											x									1
ToBRFV		x																		1
Trioza erytreae (vector)																			x	1
Xanthomonas axonopodis									x											1
Leaf cutter ant							x													1

- Large amounts of broad-spectrum synthetic insecticides are applied, which harm environmental health and negatively impact beneficial ecosystem service providers and non-target organisms.
- Producers' and consumers' health are also at high risk of chronic disease and this compromise trade.
- Unless we adopt innovative strategies, the sectors such as mango, citrus, avocado and cut flower will continue to underperform with recurrent bans and self-bans.
- Horticulture is lucrative and employs a significant population and therefore contributes to GDP.

The systems approach for pest risk management, which integrates multiple, independent pest management measures to reduce pest risk, is necessary to achieve a desired level of pest control by combining different actions (IPPC ISPM 14).



African Countries Implementing Systems Approach

Country	Crops	Pests	Importing Country
Egypt	Citrus, Mango, grappes	Ceratisis capitata, Bactrocera zonata and Lobesia botrana	Canada
Kenya	flowers	FCM	Europe
Zimbabwe	Citrus	FCM , Fruiflies and Citrus black spot	Europe
Ghana	Mango, Citrus, Papaya, Chilli Pepper, Garden Eggs, Turia, Tinda,	FCM, FF, Thrips, Mealybug	
Morocco	Citrus, myrtilles	Ceratitis capitata	USA
Zambia	flowers		
South Africa	Citrus	Ceratitis, Bactrocera	
Tunisia	Citrus	CBS	
Nigeria			
Morocco	Blueberry	European grapevine moth Lobesia botrana	Canada
Botwana	Citrus	FCM & FF	
Gambia	Mango, Chilli, Citrus and Cashew	Fruitfly (Bactrocera spp. and Ceratitis spp.), white flies, Aphids, mealybugs	European and Asia (India as in Cashew)

Trees such as mangos are resilient and require minimal inputs and serve as a fallback when subsistence crops have failed due to climate disasters.

However, tephritid fruit flies are a serious constraint to production and trade

Relevant ISPMs along the mango production chain to manage fruit fly risk

Pre-planting/preharvest	Harvest	Postharvest handling	Transport/Distribution	Export
• ISPM 4 Establishment of pest-free areas (PFAs) • ISPM 6 Surveillance for pest detection and monitoring • ISPM 8 Determination of pest status in an area • ISPM 10 Establishment of pest-free production sites • ISPM 14 Core standard for integrated pest risk management across stages	• ISPM 14 Selective harvesting based on pest status • ISPM 23 Inspection of harvested goods for compliance	• ISPM 14 Cleaning, sorting, and removing infested material • ISPM 28 Application of approved treatments (e.g., cold, heat) • ISPM 15 Regulation of wood packaging material	• ISPM 20 Compliance with import regulatory systems • ISPM 5 Standardization of phytosanitary terminology • ISPM 24 Recognition of equivalent phytosanitary measures • ISPM 14 Measures to prevent re-infestation during transport	• ISPM 7 Structure and functioning of the export certification system • ISPM 12 Phytosanitary certificate formatting and content

Relevant measures translating ISPMs

Crop	Pest	Pre-harvest	harvesting	Postharvest handling	Transport/Distribution	Export
Mango Avocado Citrus Guava Tomato	*Bactrocera dorsalis* *Bactrocera zonata* *Ceratitis capitata*	• Site selection in low pest prevalence zones • Farm registration and traceability systems • Pest surveillance and monitoring (e.g., fruit flies) • Application of Integrated Pest Management (IPM): • Biological controls (e.g., parasitoids, baiting) • Cultural controls (sanitation, pruning, bagging) • Selective pesticide use (in compliance with MRLs) • Record keeping of pest management practices	• Trained harvesters using sanitized tools • Harvesting at the maturity index required by importing country • Avoid fruit damage that could attract pests	• Cleaning, sorting, and culling infested/damaged fruits • Hot Water Treatment (HWT) or Vapour Heat Treatment (VHT) • Cold chain management • Packaging in pest-proof materials with labeling	• Cold storage or temperature monitoring during transit • Use of pest-proof containers or refrigerated transport • Avoid mixing treated and untreated fruits	• Final inspection by NPPO • Issuance of a phytosanitary certificate confirming compliance • Verification of the systems approach implementation checklist

Cameroon's experience in using the System Approach for the phytosanitary control of mangoes exported to the European Union

For several years, mango exports from Cameroon have been subject to multiple interceptions upon entry into the European Union due to the presence of fruit flies (Tephritidae).

Following the entry into force of Commission Implementing Regulation (EU) 2019/2072 of 28 November 2019 establishing uniform conditions for the implementation of Regulation (EU) 2016/2031, Cameroon has developed a mango technical file on the **systems approach** to fruit fly control in accordance with ISPM 14 and ISPM 35 and meets the requirements of Implementing Regulation (EU) 2019/2017.

This system approach is based on four main pillars:
Governance of systems, Operational processes, Skills management, Communication, and relationship dynamics between stakeholders.

GOUVERNANCE OF SYSTEMS APPROACH

To make the system approach practical, Cameroon has since 2018 adopted governance for the export of fruits and vegetables, in general, and fresh mangoes in particular.

This includes:

- Establishment of a working group for preparing the technical files **for certain fruits (mangoes, peppers, eggplants, papayas)**, as well as drafting official technical regulations
- Specific regulatory texts for production, certification, traceability, internal audits, and monitoring interception

- Planning of the mango export campaign through **a circular letter from the minister and service notes** from the regional delegates
- A coordination system for the activities of each stakeholder
- The deployment of **human, financial, and material resources**

OPERATIONAL PROCESSES

The operational processes of the system approach involve the following operations:

Registration of operators

- ❖ Identification and coding of orchards and mango packing stations
- ❖ Orchards management (sanitation, trapping with fruit fly monitoring, fly control methods, harvesting)
- ❖ Phytosanitary inspection (after harvest, at the packing station and at the airport)
- ❖ Traceability of batches
- ❖ Issuance of the phytosanitary certificate
- ❖ Monitoring of interception

Internal and external audits




SKILLS MANAGEMENT

Since 2019, following the submission of the mango technical file to the EU, the Cameroonian National Plant Protection Organization has been organizing capacity-building sessions for various actors in the export chain, namely producers, exporters, and official control agents.

Several themes have already been developed with the support of COLEAD and IAEA (International Atomic Energy Agency), for example:

- Training on EU phytosanitary regulation and the issuance of phytosanitary certificates with additional declaration (Dakar, Senegal, 2019)
- Training of official control agents on surveillance and identification of fruit flies (ICIPE, Nairobi, Kenya, 2022)
- Training of official control agents and quality managers of mango exporting companies on conducting internal audits and implementing a Quality Management System (Douala, Cameroon, 2023)
- Online training on shipment sampling methods compliant with ISPM 31 in 2024
- Online training on the EU TRACE NT tool for use in phytosanitary certificates and monitoring interception notifications in 2025

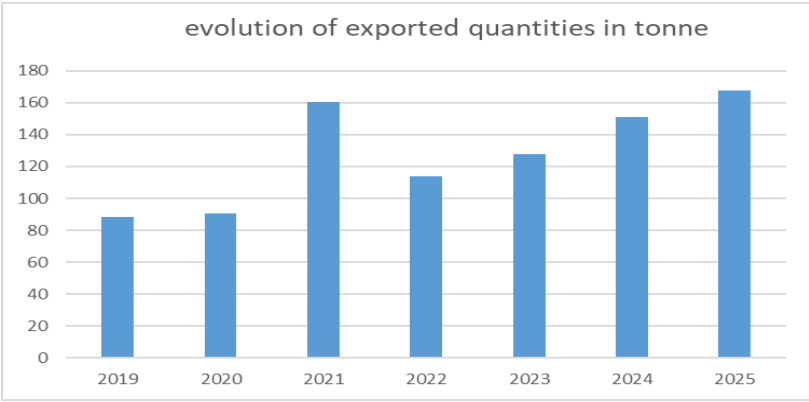
Communication and relationship dynamics between stakeholders

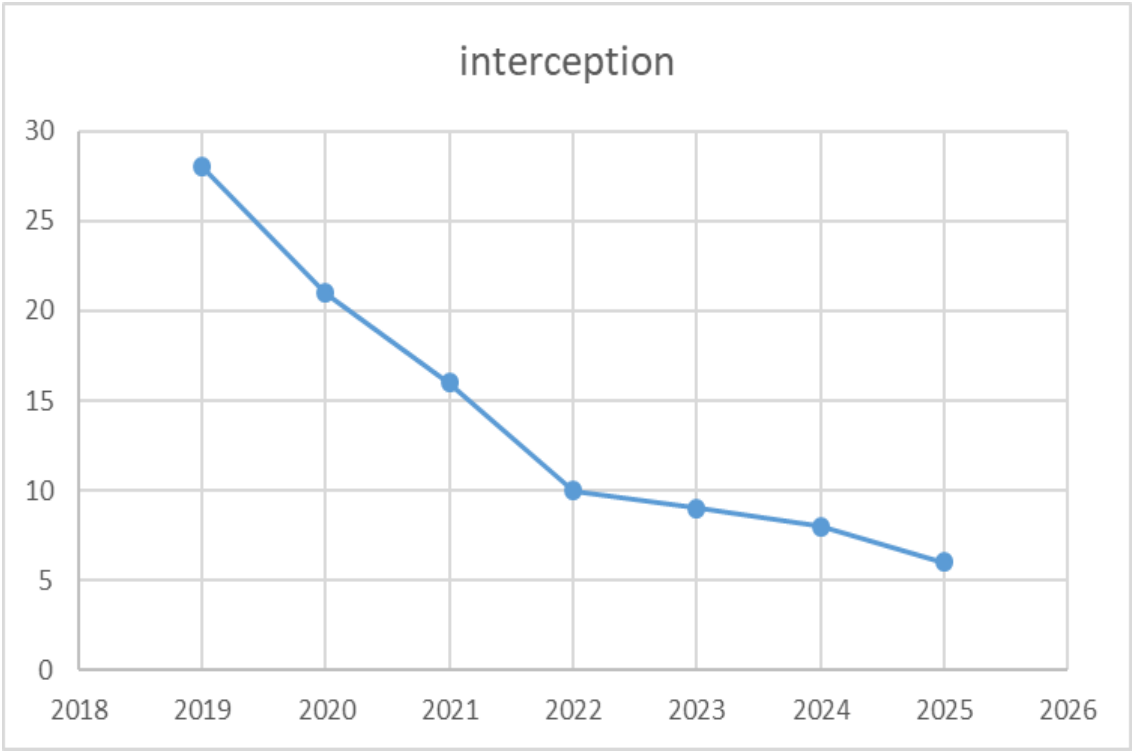
Regarding communication and stakeholder relations, a consultation mechanism has been established through the **Cameroon Mango Task Force**, facilitating dialogue between industry professionals and also relevant authorities
This Task Force is highly active in the domain of fresh mangoes destined for export to the EU and follows up on the mango technical dossier submitted to the EU's
The working group stemming from the **Cameroon Horticultural Network** holds regular and extraordinary meetings and exchanges with the Ministry of Agriculture and Rural Development on all aspects of the mango sector.

A **WhatsApp platform exists** for use between **exporters and officials**, generally fosters exchanges among all stakeholders in the sector and strengthens ties
The receipt and transmission of applications from operators wishing to export fresh mangoes along with the mechanism for monitoring notifications and interceptions, also contribute to the communication dynamics among the relevant stakeholders

Positive Impacts on the Export System of Cameroonian Mangoes

- The systems approach has organized the mango export sector by identifying stakeholders, structuring phytosanitary inspections, and clarifying roles during each export season.
- Using fly monitoring in orchards assesses infestation levels, guiding control measures or disqualification.
- Staged inspection ensures traceability of exported batches, increasing export volume and reducing interceptions.





Mitigating FCM challenges; A Systems Approach

- The floriculture sector is important for Kenya growth and support for thousands of households
- Kenya considers the sector as an important economic driver and area of collaboration with EU
- In 2024, Kenya exported over 102,500 tons of fresh cut flowers and buds, with a value of 507.7 million Euro where a significant percentage went to EU

- False Codling Moth (FCM) – occurs in Sub-Saharan Africa but is a quarantine pest in Europe. FCM poses a significant threat to the export of Kenyan rose cut flowers, especially to the European Union.

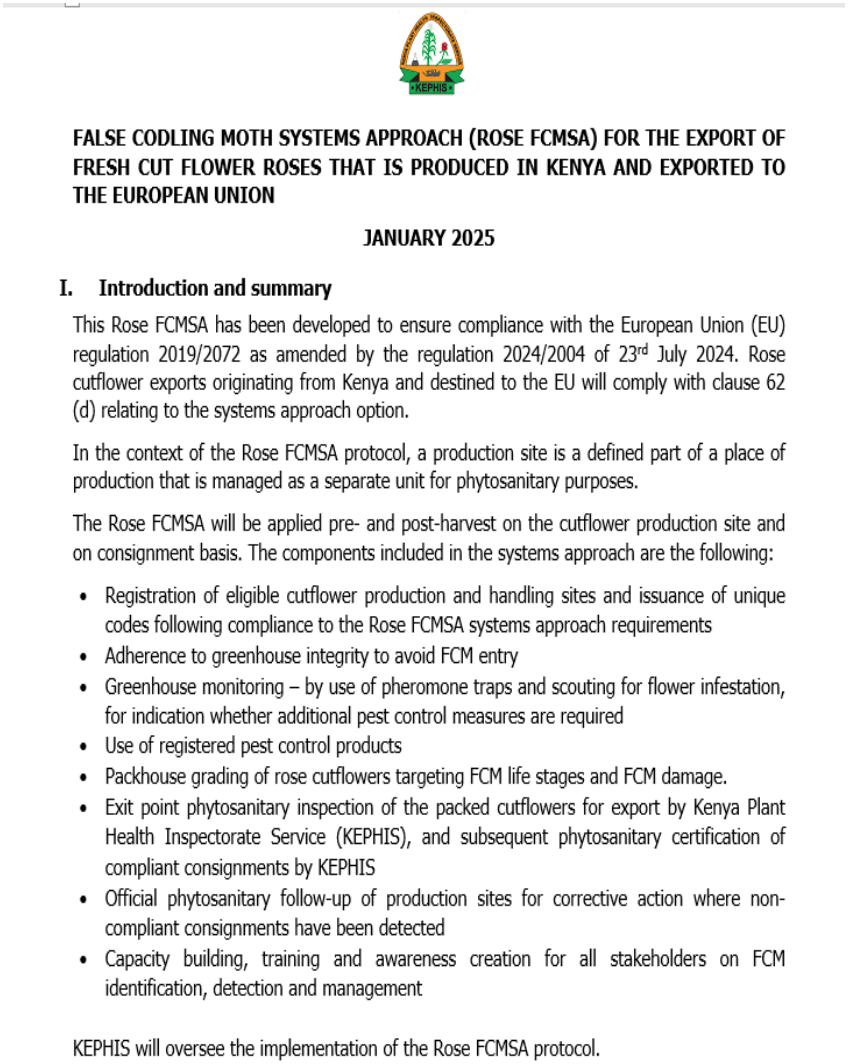
- Impacts of FCM:
- Stringent phytosanitary requirements for access to the EU market, with border checks increasing from 10% in 2020 to 25% in May 2024.

- The need for growers and exporters to realign production processes to meet these strict requirements.

- Other challenges include logistics and infrastructure limitations, as well as restricted chemical pest control options due to strict regulations.

- EFSA Assessment (2023) found fresh-cut roses as a pathway for FCM
- The amended EU Regulation 2024/2004 offers four (4) options for a country to choose the most applicable measure to ensure phytosanitary compliance.

- Kenya adopted the option of **a systems approach for control of FCM** as the most applicable measure and developed the FCM Systems Approach Protocol for the production of roses to the EU.



FALSE CODLING MOTH SYSTEMS APPROACH (ROSE FCMSA) FOR THE EXPORT OF FRESH CUT FLOWER ROSES THAT IS PRODUCED IN KENYA AND EXPORTED TO THE EUROPEAN UNION

JANUARY 2025

I. Introduction and summary

This Rose FCMSA has been developed to ensure compliance with the European Union (EU) regulation 2019/2072 as amended by the regulation 2024/2004 of 23rd July 2024. Rose cutflower exports originating from Kenya and destined to the EU will comply with clause 62 (d) relating to the systems approach option.

In the context of the Rose FCMSA protocol, a production site is a defined part of a place of production that is managed as a separate unit for phytosanitary purposes.

The Rose FCMSA will be applied pre- and post-harvest on the cutflower production site and on consignment basis. The components included in the systems approach are the following:

- Registration of eligible cutflower production and handling sites and issuance of unique codes following compliance to the Rose FCMSA systems approach requirements
- Adherence to greenhouse integrity to avoid FCM entry
- Greenhouse monitoring – by use of pheromone traps and scouting for flower infestation, for indication whether additional pest control measures are required
- Use of registered pest control products
- Packhouse grading of rose cutflowers targeting FCM life stages and FCM damage.
- Exit point phytosanitary inspection of the packed cutflowers for export by Kenya Plant Health Inspectorate Service (KEPHIS), and subsequent phytosanitary certification of compliant consignments by KEPHIS
- Official phytosanitary follow-up of production sites for corrective action where non-compliant consignments have been detected
- Capacity building, training and awareness creation for all stakeholders on FCM identification, detection and management

KEPHIS will oversee the implementation of the Rose FCMSA protocol.

Components of FCM Systems Approach – KEPHIS

Evaluation of measures

Independent	Dependent	Compensating
Greenhouse integrity	Double door system	Sanitation
	Side netting	Maintenance procedures
	Cover material	Covering of top vents
Pest management	Scouting	Communication
	Chemical	Data collection
	Monitoring	Risk Profiling
	Capacity	Traceability
		Biological
		Cultural
		Trapping
		Training
QC packhouse	Handling of non-compliant material	Sampling
		Risk Profiling
Exit point inspections	Integrity of the consignment	Risk Profiling
	Consignment compliance	Traceability
	Documentation	Sampling
	Handling of non-compliant material	
Systems audit	Packhouse systems	Risk Profiling
	Production systems	Traceability
	Exit point systems	Sampling

OVERVIEW OF FCMSA PROTOCOL

Criteria for production site approval

- Establishment of a production site
- Undertake pest risk management measures
- Provide appropriate training to personnel responsible for production at the greenhouse and packhouse on requirements of the *Rose FCMSA* protocol

- Establish a traceability system in compliance to the *Rose FCMSA* protocol
- Sign a commitment form to comply with the *Rose FCMSA* protocol
- Send weekly pest scouting data to KEPHIS

FCM Risk Management measures

- Adherence to greenhouse structure integrity
- Monitoring through pheromone traps
- Monitoring through scouting
- Pest management using pesticides
- Examination of cut flowers at harvest
- Inspection pack house (intake, online, Final)
- Examination of cut flowers at the exit point

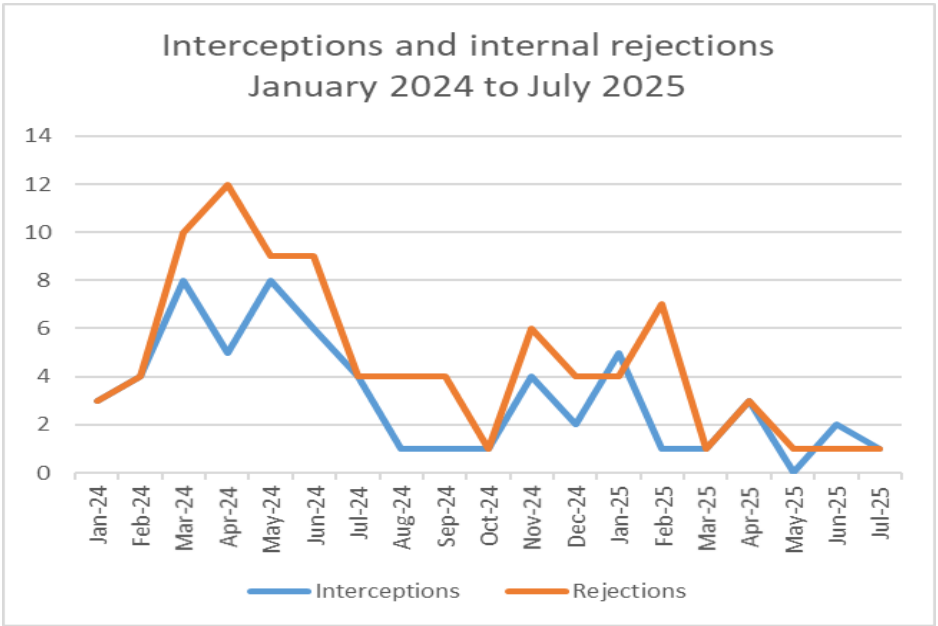
Official monitoring of the Rose FCMSA protocol implementation

Quarterly audits include:

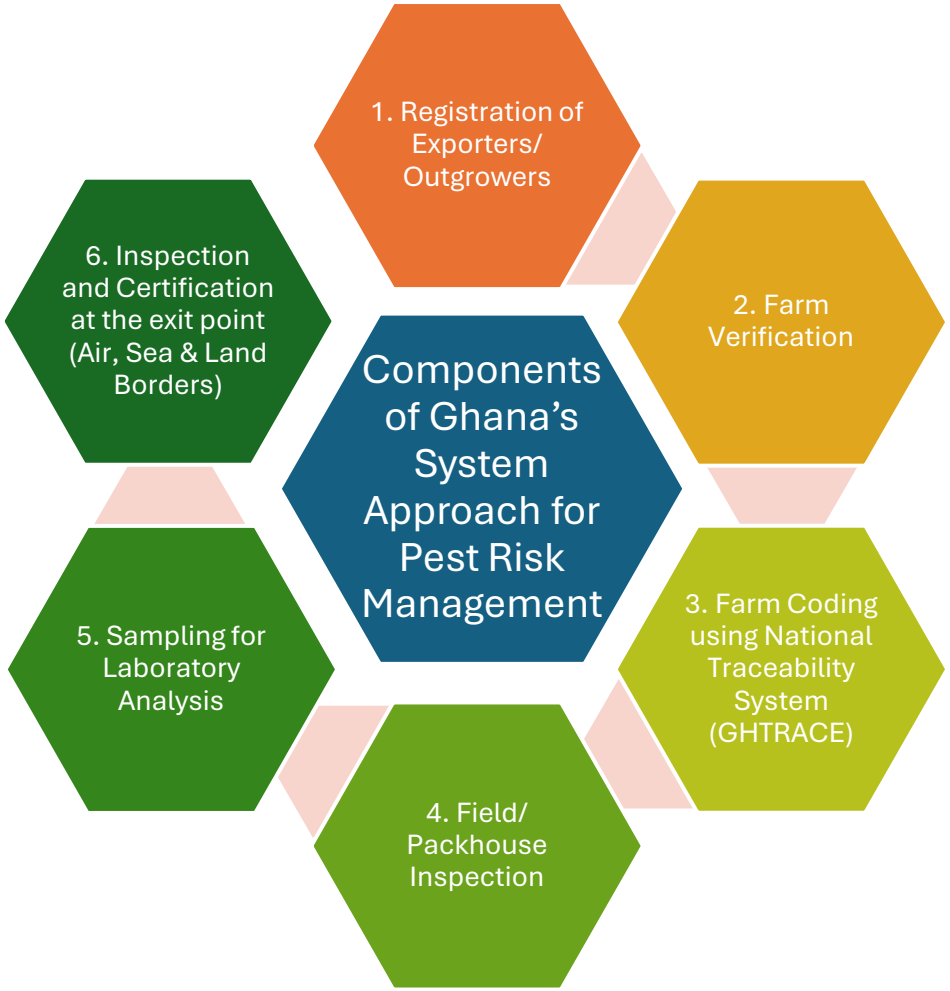
- Inspection of fresh-cut flower shipments
- Risk profiling (production site status, rejections, interceptions, varieties)
- Greenhouse and packhouse KEPHIS official audits

Major Challenges: Detection

- 2018 to 2020 inspection level was 5%
- From 2020 inspection level increased to 10%
- From 1st May 2024, inspection level 25%
- From 26th April 2025, special requirement (System approach)
  - Documentary evidence
  - Production codes
- Since Apr 26th, 2025
- FCM Rejections=4
- FCM Interceptions=3



THE SYSTEM APPROACH, GHANA'S PERSPECTIVE



LIST OF HIGH-RISK COMMODITIES AND THEIR POTENTIAL ASSOCIATED ORGANISMS

No.	Commodity*	Potential Pests
1	Chilli Pepper	FCM, Fruit flies (Ceratitis), Thrips, Mealybugs, Whiteflies, Spider mites, Aphids
2	Garden Eggs	FCM, Shoot & Fruit borer (*L. orbonalis*), Fruit flies, Thrips, Mealybugs, Whiteflies
3	Turia	Fruit flies (Bactrocera, Dacus, Zeugodacus spp.), Thrips, Whiteflies
4	Tinda	Fruit flies (Bactrocera, Dacus, Zeugodacus spp.)
5	All Cucurbitaceae (Bitter, Bottle, Snake gourds)	Fruit flies (Bactrocera, Dacus, Zeugodacus spp.), Thrips
6	Mango	Fruit flies, Stone weevils, Mealybugs, Scale insects, Thrips, Whiteflies
5	Citrus	FCM, Fruit flies, Mealybugs, Scale insects, Thrips, Whiteflies, Citrus black spot, Angular leaf spot
6	Papaya	Fruit flies, Mealybugs (Paracoccus spp.), Scale insects, Thrips, Whiteflies
7	Leafy Vegetables	Mealybugs, Scale insects, Thrips, Whiteflies, Leafminers
8	Planting Materials	Thrips, Scale insects, Thrips, Whiteflies, Borers
9	Seeds	Presence of Smut (small flakes of soot), Corticum Black powder of bunt spores

SYSTEM APPROACH FOR FALSE CODLING MOTH (FCM)

- Field sanitation/Farm Hygiene
- Plough before transplanting during the dry spell to expose the larvae/pupae to the natural enemies and extremes of heat

- Avoid growing pepper in close proximity to alternate host crops, e.g., garden eggs, maize, cotton, tomatoes, okra, pigeon pea, and sweet potato.
- Trap pests with lures baited with insecticides
- Recommended insecticides- Neem, Viper, Protocol, Eradicoat, and Ecopel
- Bio-control can be exploited

- Pest scouting and monitoring (mass trapping of insects using sticky and pheromone traps
- Use of environmentally friendly, less persistent, and nationally approved insecticides.
- Sampling and laboratory analysis
- Inspection and certification at the point of exit

PACKHOUSE INSPECTION

Packhouse inspections are done after the registration of exporters. This is done to ensure that agricultural commodities exported or distributed domestically meet pest-free and export standards.

- A team of NPPO inspectors verify that the packhouse follows approved pest management protocols, such as **cleaning, sorting, washing, grading, and disinfection, etc.**

- This ensures that produce entering the packhouse has been sourced from registered and inspected farms, already under pest monitoring and control measures.

- As a result, the packhouse does not become a point of pest introduction or spread

SAMPLING FOR LABORATORY ANALYSIS

Samples from the early harvest are picked by an inspector and incubated at the NPPO diagnostic laboratory for 7-10 days, though this may vary depending on the target pest.

This is done to ascertain the pest status of the commodities/produce before being allowed to be harvested and presented for final inspection and certification at the specified exit point.

TURIA UNDER INCUBATION, PRESENCE OF STONE WEEVIL IN MANGO

DESTRUCTIVE SAMPLING on *Capsicum frutescens and Luffa acutangula*

INSPECTION AND CERTIFICATION FOR EXPORT AT THE EXIT POINTS

Inspection and certification at the exit point (such as seaports, airports, or land border posts) are key phytosanitary measures to ensure that only pest-free consignments are exported or moved out of the country.

In Ghana, high-risk agricultural produce (highly perishable) is subjected to strict and complex Phytosanitary regulations before export.

A 24-hour prior shipment notification platform is created at the Airport to ensure that adequate officers are made available to handle the declared consignments.

Capacity building

- KEPHIS, in collaboration with the companies, undertook staff training on EU requirements and FCM identification.
- Handholding/coaching of farms with repeated interceptions to continue until all the farms are fully compliant.

CHALLENGES TO OVERCOME IN CAMEROON

- Regular mobilization of financial and material resources by stakeholders for the implementation of export campaign activities,
- Security in the main mango-producing areas for export to the EU,
- Existence of a capacity-building plan for stakeholders,

- Existence of infrastructure for the conservation of mangoes before shipment at the airport,
- Regularity of flights for transporting mangoes to the EU,

- Mastering heat treatment as a complementary measure to the system approach,
- Good collaboration with EU border control posts

Challenges in Kenya

- Data retrievability and consistency
- Collaboration: Resource-intensive
- Knowledge: Data tools and implementation
- Preparedness: Uniformity (DG Sante Audit)

Challenges in Ghana

The key challenges limiting the effective System Approach implementation include:

- **Limited resources:** Inadequate transport and logistics undermine consistent implementation and field supervision
- **Limited infrastructure:** Inadequate packhouses, inspection facilities, and equipment affect compliance verification.
- **Unavailability of key Plant Protection Products:** Limited availability of plant protection products, such as pheromone traps and biorational products, impacts the level of compliance at the farm level

Conclusion

- **The implementation of the systems approach in FCM Management has significantly reduced FCM interceptions since its introduction.**
- KEPHIS collaborates with the Ministry of Agriculture, other government agencies, industry and their representative business member organizations (KFC, FPEAK, AAK) and development partners in FCM management

- **The implementation of the Systems Approach in Ghana has ensured effective pest risk management, facilitated trade and sustained agricultural production.**

- **This approach has helped Cameroon maintain its mango market within the EU. The systems approach has had positive impacts on Cameroon's mango exports.**
- **This approach would be even more effective if the following challenges were overcome.**

Conclusions

- Systems Approach offers countries the opportunity to export while the pest is still regulated.
- However, implementing it requires a concerted effort (Collaboration, Communication, Personnel, Equipment, Finances) from all actors in the value chain.
- Economic models with cost-benefit considerations (Efficacy/Cost) must be evaluated.
- Regulatory bodies need to lighten this ISPM.

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