

**MINISTRY OF  
AGRICULTURE,  
ANIMAL HUSBANDRY,  
AND FISHERIES**



**RÉPUBLIQUE TOGOLAISE**

**TOGOLESE REPUBLIC**

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**WORK-LIBERTY-HOMELAND**

# **NATIONAL ACTION PLAN ON CASSAVA VIRAL DISEASES IN THE TOGOLESE REPUBLIC**

**WEST AFRICAN VIRUS EPIDEMIOLOGY FOR FOOD SECURITY  
(WAVE)**



**DECEMBER 2018**

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## LIST OF ABBREVIATIONS

ACMV	African cassava mosaic virus
AfDB	African Development Bank
ANSAT	Agence nationale de la sécurité alimentaire du Togo (Togo National Food Security Agency)
AUF	Agence universitaire de la Francophonie (Francophone University Agency)
BMGF	Bill & Melinda Gates Foundation
CAGIA	Centrale d’approvisionnement et de gestion des intrants agricoles (Central Office for Purchase and Management of Agricultural Inputs)
CBSD	Cassava brown streak disease
CBSV	Cassava brown streak virus
CBSV-UG	Ugandan cassava brown streak virus
CFA	the currency of French-speaking West Africa
CMD	Cassava mosaic disease
CORAF	West and Central African Council for Agricultural Research and Development
CTOP	Coordination togolaise des organisations paysannes (Togolese coordinating body for farmers’ organizations)
DFID	Department for International Development
DFV	Direction des filières végétales (Directorate for Crop Sectors)
DPV	Direction de la protection des végétaux (Plant Protection Directorate)
DSID	Direction des statistiques agricoles, de l’informatique et de la documentation (Directorate of Agricultural Statistics, IT, and Documentation)
DSP	Direction des semences agricoles et plants (Directorate of Agricultural Seeds and Plants)
EACMCV	East African cassava mosaic Cameroon virus
EACMV	East African cassava mosaic virus
EACMV-UG	East African cassava mosaic virus–Uganda
ECOWAS	Economic Community of West African States
ELISA	Enzyme-linked immunosorbent assay
EOC	Emergency operations center
ESA	Ecole Supérieure d’Agronomie (Ecole Supérieure of Agronomy)
FAO	Food and Agriculture Organization of the United Nations
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German society for international cooperation)
ICAT	Institut de conseil et d’appui technique (Institute for Technical Advice and Support)
IFAD	International Fund for Agricultural Development
IFC	International Finance Corporation
IFDC	International Fertilizer Development Center
IITA	International Institute of Tropical Agriculture
IMF	International Monetary Fund
IsDB	Islamic Development Bank
ITRA	Institut togolais de recherche agronomique (Togolese Institute for Agronomy Research)
MAEP	Ministère de l’agriculture, de l’élevage et de la pêche (Ministry of Agriculture, Livestock, and Fisheries)
MDBAJEJ	Ministère du développement à la base, de l’artisanat, de la jeunesse et de l’emploi des jeunes (Ministry of Grassroots Development, Crafts, Youth, and Youth Employment)
MESR	Ministère de l’Enseignement Supérieur et de la Recherche (Ministry of Higher Education and Research)
NGO	Non-governmental organization

PAEIJ-SP	Projet d'appui à l'employabilité et à l'insertion des jeunes dans les secteurs porteurs (Project to support youth employability and integration in growth sectors)
PCR	Polymerase chain reaction
PNIASAN	Programme national d'investissement agricole et de sécurité alimentaire et nutritionnelle (National Plan on Agricultural Investment, Food Security, and Nutrition Security)
RCA	Rolling circle amplification
UL	University of Lomé
UNCTAD	United Nations Conference on Trade and Development
USAID	United States Agency for International Development
WADB	West African Development Bank
WAEMU	West African Economic and Monetary Union
WAVE	West African Virus Epidemiology for Food Security
WB	World Bank

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## FOREWORD BY THE MINISTER FOR AGRICULTURE

By setting up an Emergency Operations Center (EOC) to tackle cassava viral diseases in Togo, we address the need to put prevention at the heart of our strategy for managing this threat to our country. The cassava mosaic disease epidemic in West Africa and specifically Togo is serious, and our country is not immune to the advance of the cassava brown streak disease that was once rampant in East Africa. Faced with this alarming situation, we have decided to step up prevention and detection and to coordinate all activities that respond to emergencies or disasters linked with this affliction. We hope that this will give us better control over the risks and the impact of events that are likely to harm food security for the Togolese people. The urgency of this situation leaves no room for improvisation.

I am pleased to note that there are currently many initiatives in Togo to establish or strengthen structures for the development of high-growth-potential sectors. The National Development Plan and new agricultural policy, together with the national plan for agricultural investment, food security, and nutrition security (PNIASAN), have put the focus on improving income and living conditions for agricultural workers and on redressing the balance of trade by encouraging exports and reducing imports. The cassava sector was specifically identified, due to growing local and international demand for its range of raw and processed products. National stakeholders involved in Togo's cassava sector and the International Institute of Tropical Agriculture (IITA) have agreed to work together to develop the sector, with financial support from the African Development Bank (AfDB).

To get the reliable data needed to design interventions for cassava sector development in Togo, we must analyze the current situation, taking into account the constraints on production and particularly viral diseases. Among these diseases, two are a serious threat to cassava productivity. They are cassava mosaic disease (CMD), which is found in all production zones, and cassava brown streak disease (CBSD), which is spreading towards Togo. These two viral diseases cause yield loss that can reach 100%. A specialist facility for preventing, detecting, and responding to these viral threats is therefore needed.

An initiative of this type was launched in Togo during the avian influenza outbreak and it continues to prove its worth.

The EOC must coordinate prevention, detection, and outbreak response activities through strong leadership with a shared vision across all operations. Activities will be carried out through a concerted, multisector framework.

I would like to emphasize the five principles that guided the development of the first five-year strategic plan for the EOC:

- **Cooperation and partnership:** Setting up the EOC will promote partnership between different stakeholders with a view to strengthening food security in Togo. By combining their efforts, stakeholders will be in a better position to help achieve this goal. The EOC's role will be to establish a reliable national prevention, detection, and response system by coordinating the activities of all stakeholders and developing an ethos of open and effective collaboration.
- **Capacity building:** Working together with stakeholders, the EOC will identify all needs to build capacity through human resources and infrastructure so that the threat management system is effective.
- **Fitting in with international efforts:** The EOC will work together with Community, regional, and international bodies to make sure its activities are aligned with their

phytosanitary requirements and provisions. In this way, the entire international system can be strengthened.

- **Creating an agile, autonomous, and visionary organization:** The EOC will be an innovative organization that accesses new resources, is informed by the most recent research findings, and uses appropriate technologies and techniques. This will place the EOC in a position to serve the entire Togolese phytosanitary system.
- **A sustainable national phytosanitary system:** The qualified staff and infrastructure inherited from setting up and running the EOC will give Togo a stronger, more sustainable phytosanitary system that is shaped by the provisions made.

Cassava is one of the staple foods that plays a key role in food security in our country. I therefore place great importance on the implementation of this strategic plan, and I hope that it will benefit from the support and commitment of all stakeholders in our agricultural and phytosanitary system and of all our partners.



Minister for Agriculture,  
Animal Husbandry, and  
Fisheries

## SUMMARY

Cassava is a crop of great economic and social importance to the Togolese people. Its mean yield of 10 metric tons per hectare remains below the average in the West African subregion. This low yield is caused by several biotic constraints, including the effects of diseases and pests. Cassava mosaic disease (CMD) is the main viral disease that affects cassava production in Togo and the most significant threat to food security. The danger is all the worse because another threat is approaching from East and Central Africa, namely cassava brown streak disease (CBSD).

The overall objective of this national action plan is to sustainably improve cassava productivity, ensure food security, and increase income for producers by managing cassava viral diseases. Its specific aim is to set up a system for monitoring, preventing, detecting, and responding to the threat of cassava viral diseases in Togo.

This document sets out the national plan for preventing, detecting, and responding to cassava viral diseases and is divided into five sections. **Section 1** covers the background on cassava viral diseases in the country and the key players involved in the cassava value chain. It then describes the levels of risk from diseases and the current procedure for managing outbreaks, with its strengths and weaknesses. **Section 2** sets out a vision for the national action plan with five strategic objectives for tackling viral diseases in Togo. **Section 3** describes the structure of the Emergency Operations Center (EOC). It covers its institutional anchoring, how it will be governed, and the human, financial, and material resources required to manage the EOC. **Section 4** examines the actions to be taken before an outbreak and if one occurs, along with phytosanitary measures. It covers the risk analysis method, definitions of risk level, plans, surveillance, prevention, engagement, and partnerships to be developed before an outbreak; methods for detection, identification and confirmation, intervention, containment, quarantine, and elimination; how the system is activated and operates; and evaluation of the response. Finally, **section 5** is a plan for carrying out the strategy, including a roadmap, system for mobilizing resources, management of risks related to implementing the action plan, and monitoring and evaluation plan.

## I. CONTEXT

### Current national situation in relation to cassava viral diseases

#### Economic and social importance

Cassava is a crop of great economic and social importance to the Togolese people. It is grown in each of the country's five economic regions and is produced by more than 69% of farming households (MAEP-Togo, 2013). In 2014, the Togo Accelerated Growth Plan estimated the economic productivity of cassava as 493,000 CFA francs per hectare. The national production of cassava in 2016 was evaluated as 1,027,476 metric tons (FAO, 2016). In terms of surface area, cassava is the fourth most common crop after maize, sorghum, and black-eyed peas.

Local products derived from cassava are many and varied. Cassava is eaten as boiled and ground slices (fufu) or consumed in the form of gari, tapioca, cossettes, fermented cassava paste, fufu flour, bread flour, and powdered cassava starch, which are the subject of substantial trade (Somana et al, 2008). It is mainly processed by organizations of women, who normally use traditional tools (rasps and presses) with a production capacity ranging from 0.5 to 2.5 metric tons per week.

Several abiotic and biotic constraints limit the production of this important crop. Among the biotic constraints – namely bacterial, fungal, and viral diseases – viruses do the most harm. In Togo, African cassava mosaic disease is the most prevalent. Yield loss from this disease can reach 40–70%, or even 100% in some cultivars (Adjata, 2007).

#### Summary of current situation

The main threats to cassava in Togo are diseases and pests. Diseases can be caused by bacteria, fungi, or viruses, but those caused by viruses do the most harm. The most widespread and prevalent viral disease is African cassava mosaic disease (CMD). More dangerous still, cassava brown streak disease (CBSD) is approaching West Africa from the east and center of the continent.

The actions taken by the Togolese government so far consist of introducing, selecting, and distributing planting material. The International Institute of Tropical Agriculture (IITA) is supporting the government in introducing resistant plants. In addition, projects funded by CORAF have helped to sanitize local planting material and distribute this to growers.

To protect cassava crops in the country against viral threats, the following measures can be considered:

1. Selection of resistant varieties
2. Creating a nursery of resistant or sanitized cassava planting material
3. Constant surveillance at borders to stop contaminated planting material being introduced
4. Activating quarantine measures based on phytosanitary risk analysis
5. Boosting the capacities of surveillance officers and phytosanitary surveillance teams
6. Information and training for growers.

## Mapping of key stakeholders

### Along the cassava value chain

Table 1: List of actors along the cassava value chain

	Research	Inputs	Production	Storage and transport	Processing	Marketing and promotion
Public	<ul style="list-style-type: none"> <li>- MAEP</li> <li>○ ITRA</li> <li>○ ICAT</li> <li>○ DPV</li> <li>- MESR</li> <li>○ University of Lomé</li> <li>○ University of Kara</li> </ul>	<ul style="list-style-type: none"> <li>- MAEP</li> <li>○ CAGIA</li> <li>○ ICAT</li> <li>○ DPV</li> <li>○ ITRA</li> </ul>	<ul style="list-style-type: none"> <li>- MAEP</li> <li>○ ICAT</li> <li>○ DPV</li> </ul>	<ul style="list-style-type: none"> <li>- MAEP</li> <li>○ ANSAT</li> <li>○ ICAT</li> </ul>	<ul style="list-style-type: none"> <li>- MAEP</li> <li>○ ITRA</li> <li>○ ICAT</li> <li>- MDBAJEJ</li> <li>○ PAEIJ-SP</li> </ul>	<ul style="list-style-type: none"> <li>- MAEP</li> <li>○ ANSAT</li> <li>○ ICAT</li> <li>- MDBAJEJ</li> <li>○ PAEIJ-SP</li> <li>- Ministry of Commerce</li> </ul>
Private	<ul style="list-style-type: none"> <li>- IFDC</li> <li>- GIZ</li> </ul>	<ul style="list-style-type: none"> <li>- NGOs</li> <li>- Input suppliers</li> </ul>	<ul style="list-style-type: none"> <li>- NGOs</li> <li>- CTOP</li> <li>- Producers</li> </ul>	<ul style="list-style-type: none"> <li>- Producers</li> <li>- CTOP</li> <li>- Transporters</li> <li>- Sellers</li> <li>- IMF</li> </ul>	<ul style="list-style-type: none"> <li>- NGOs</li> <li>- CTOP</li> <li>- Processors</li> <li>- IMF</li> </ul>	<ul style="list-style-type: none"> <li>- Producers</li> <li>- Processors</li> <li>- Sellers</li> <li>- IMF</li> <li>- Rural radio stations</li> </ul>

### Other relevant actors

Government	Private sector	Civil society organizations / NGOs	Bilateral and multilateral partners	Other
<ul style="list-style-type: none"> <li>- Ministry responsible for agriculture</li> <li>- Ministry responsible for research</li> </ul>	<ul style="list-style-type: none"> <li>- Chamber of Agriculture</li> </ul>		<ul style="list-style-type: none"> <li>- AfDB</li> <li>- WB</li> <li>- DFID</li> <li>- USAID</li> <li>- IFC</li> <li>- FAO</li> <li>- IFAD</li> <li>- GIZ</li> </ul>	<ul style="list-style-type: none"> <li>- IITA</li> <li>- CTOP</li> </ul>

## Risk assessment

Table 2: Assessment of risks from cassava diseases

Main threats	Level of risk (low / moderate / high)	Current consequences on crops	Probability of outbreak (low / moderate / high)	Consequences if nothing is done
Fungal threats				
Anthracnose	Low	Visible symptoms in some production zones	Low	

<i>Cercospora</i> leaf spot	Low	Visible symptoms in some production zones	Low	
Bacterial threats				
Bacterial blight ( <i>Xanthomonas axonopodis</i> pv. <i>manihotis</i> )	Low	Visible symptoms in rainy season	Low	
Viral threats				
African cassava mosaic virus (ACMV)	High	All local varieties are susceptible	High	Can negatively affect yield in the most susceptible cassava varieties
East African cassava mosaic Cameroon virus (EACMCV)	High	All local varieties are susceptible	High	Can have a negative effect on cassava production
East African cassava mosaic virus–Uganda (EACMV-UG)	High	All local varieties are highly susceptible	High	Can have a negative effect on cassava production
Other threats				
N/A				

## Current risk management process

### Actions currently taken (\*)

Table 3: Actions currently taken to mitigate the risks from cassava viral diseases in Togo

Type of risk	Prevention, reduction, and strategic planning	Detection and intervention	Monitoring and evaluation
<ul style="list-style-type: none"> <li>- Viral diseases:               <ul style="list-style-type: none"> <li>o ACMV</li> <li>o EACMCV</li> <li>o EACMV-UG</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Use of healthy cuttings</li> <li>- Good agricultural practice</li> <li>- Control of planting materials at borders (checkpoints)</li> <li>- Monitoring fields for the disease</li> <li>- Alerting systems</li> </ul>	<ul style="list-style-type: none"> <li>- Surveillance of fields by agricultural agents</li> <li>- Sampling</li> <li>- Detection tests in laboratories (DPV, ITRA, WAVE/University of Lomé)</li> <li>- Intervention</li> </ul>	<ul style="list-style-type: none"> <li>- Characterization of pathogen</li> <li>- Evaluation of incidence in the area sampled</li> <li>- Information, support, and advice for technical agents and growers</li> </ul>

(\*) For risks classed high or moderate above

## Gap assessment

### Strengths

1. Government is enthusiastic about the cassava sector, which has been chosen as a reference sector in Togo
2. Modern seed sector emerging, supervised by the Directorate for Crop Sectors (DFV)
3. Stakeholders' capacities strengthened with regard to cassava viral disease threats through ongoing activities in Togo, especially through the WAVE–University of Lomé (WAVE-UL) project
4. Phytosanitary diagnosis of viral diseases already introduced by WAVE-UL
5. Viral diseases mapped nationally by WAVE-UL
6. Producers have a growing interest in cassava as a source of food, especially in the hunger gap, and of income
7. Surface areas sown are increasing year on year; leading producers emerging in the sector
8. Increasing number of processing units
9. High demand from processing units for raw material and high demand for processed products (gari, flour, tapioca, starch)
10. Emergence of growers' organizations, signaling interest in the crop
11. Existence of multi-stakeholder innovation platforms in the main production zones
12. Sector supported by public bodies, projects, and NGOs (distribution of cuttings for production, support with processing)
13. Local equipment suppliers are available for cassava processing
14. Stable jobs created for young people and women.

### Weaknesses

1. Shortage of human resources in agricultural extension, meaning technology packages do not reach all production zones
2. Field agents and growers have poor knowledge of cassava diseases and pests
3. Lack of human and material resources in laboratories
4. Alerting systems not operational
5. Growers have weak organizational capacities
6. Seed sector not organized, hence use of "any old" planting material
7. Lack of information and training for sector stakeholders on cassava viral diseases in Togo

### Key takeaways

Based on the above analysis of strengths and weaknesses, the following key improvements should be made:

1. Formalize the cassava seed sector and ensure cassava planting material is distributed to growers
2. Train specialist cassava breeders
3. Train all actors in the cassava sector on how to recognize cassava viral diseases

4. Increase laboratories' capacities
5. Organize cassava growers
6. Raise awareness and build capacity among phytosanitary inspectors
7. Make the alerting system operational and permanent

Based on the observations, for some cassava viral diseases (EACMV-UG and CBSV), prevention and control measures need to be mandatory. A specific crisis management plan for cassava diseases is therefore needed.

## II. STRATEGIC OBJECTIVES AND VISION OF THE NATIONAL ACTION PLAN

### Vision

By the start of 2023, Togo is in a position to sustainably improve cassava productivity and to ensure food security and increased income for growers through preventive measures and an effective, efficient response to cassava viral diseases.

### Strategic objectives

#### Strategic objective 1: Introduce a collective governance system for cassava virus outbreaks in Togo

**Activity 1:** Raise awareness among the authorities

**Activity 2:** Organize national workshops

**Activity 3:** Draw up regulatory texts for the EOC

**Activity 4:** Form and establish the Emergency Operations Center (EOC)

**Activity 5:** Form and establish the EOC's committees and surveillance units

**Activity 6:** Activate quarantine units at borders

**Activity 7:** Organize a national workshop with cassava sector stakeholders

#### Strategic objective 2: Introduce a rapid diagnosis system for cassava viral diseases in Togo

**Activity 1:** Map and georeference production zones

**Activity 2:** Continue mapping and georeferencing cassava viral diseases

**Activity 3:** Evaluate the extent of national and cross-border traffic in cassava cuttings

**Activity 4:** Collect and characterize national cassava germplasm

**Activity 5:** Operationalize the surveillance of viral disease threats in cassava production zones

#### Strategic objective 3: Develop effective methods of combating cassava viral diseases and their vectors

**Activity 1:** Establish production standards for resistant and sanitized cassava planting material

**Activity 2:** Draw up an inspection protocol for cassava planting material

**Activity 3:** Operationalize a sanitation and *in vitro* conservation unit for cassava germplasm in Togo

**Activity 4:** Explore alternative vector control methods and strengthen sustainable vector control methods

**Activity 5:** Operationalize the quarantine system

**Activity 6:** Create a georeferenced list of cassava seed producers

#### Strategic objective 4: Set up an information and communications system for all cassava diseases, particularly viruses

**Activity 1:** Produce radio/TV programs

**Activity 2:** Organize awareness roadshows

**Activity 3:** Produce documentaries

**Activity 4:** Create posters, factsheets, and leaflets

#### Strategic objective 5: Build the technical and material capacities of actors in the prevention, surveillance, and response system

**Activity 1:** Train members of the EOC Committee and surveillance units

**Activity 2:** Train seed inspectors

**Activity 3:** Train seed producers

**Activity 4:** Train phytosanitary inspectors and phytosanitary control officers

**Activity 5:** Train agricultural surveillance officers

**Activity 6:** Train cassava growers

**Activity 7:** Train technicians and researchers

**Activity 8:** Acquire additional equipment for operations in the *in vitro* culture laboratory

**Activity 9:** Acquire equipment and materials for phytosanitary field inspections

**Activity 10:** Acquire additional equipment for operations in the virology laboratory

**Activity 11:** Acquire mini greenhouses, including one that has security level 2, for quarantine services

**Activity 12:** Build and furnish the EOC office

**Activity 13:** Train specialist cassava breeders

## III. STRUCTURE OF THE EMERGENCY OPERATIONS CENTER (EOC)

### Institutional anchoring

The EOC will be set up under the Ministry of Agriculture and housed in the Plant Protection Directorate (DPV). There is currently no national action plan on pests and diseases that the EOC could be linked with.

### Governance

#### Mandate

The EOC will be responsible for the following tasks:

- Prevention
- Outbreak response
- Controlling cassava viral threats
- Coordinating the implementation of the national action plan.

The EOC will be set up under the Ministry of Agriculture. It will be created and established by decree.

#### Organizational oversight

The EOC will be supervised by a Steering Committee, which will be responsible for deciding its strategic priorities but will not play a role in its operations.

The Steering Committee will consist of two members from WAVE and seven other members, one from each of the following organizations: the DPV, the Togolese Institute for Agricultural Research (ITRA), the Institute for Technical Advice and Support (ICAT), the Togolese coordinating body for farmers' organizations (CTOP), the University of Lomé, the Ministry of Agriculture, Livestock, and Fisheries (MAEP), and the Ministry of Higher Education and Research (MESR). This committee will be accountable to the Minister for Agriculture.

### Organizational structure

#### Governing bodies and departments

##### Managing bodies:

- The Steering Committee will be the strategic committee, tasked with defining strategic orientations and making strategic decisions. Its members will come from WAVE, the universities, the DPV, ITRA, ICAT, CTOP, MAEP, and MESR.
- EOC Operational Coordination will be responsible for coordinating the activities of the various EOC sections and will make sure that strategic decisions made by the steering committee are implemented.

**Sections** under the control of EOC Operational Coordination:

- The *Administration and Finance* section will ensure effective and efficient management of the human, financial, and material resources allocated to the EOC.
- The *Communication and Awareness Raising* section will ensure that information on preventing, detecting, and responding to cassava viral diseases is distributed to all stakeholders.
- The *Surveillance and Quarantine* section will be responsible for epidemiological surveillance and for quarantining infected zones and/or planting materials.
- The *Vector Control* section will oversee an integrated vector control strategy to keep vector populations below a harmful level.
- The *Laboratory Services* section will analyze samples taken from the field.
- The *Community Engagement* section will engage grassroots actors in disease management.

### Hierarchical and decision-making structure

EOC Operational Coordination implements decisions made by its superior, which is the Steering Committee, and is responsible for coordinating the activities of the different sections.

Chain of communication: Information on signs of a disease outbreak comes from field observations. This information reaches EOC Operational Coordination, and the coordinator informs the Minister via the DPV.

Decision-making process: The decision to act is made by the EOC coordinator, who tasks all the heads of section (Administration and Finance, Surveillance and Quarantine, Communication and Awareness Raising, Community Engagement, Vector Control, and Laboratory Services) to implement the decisions made.

### Organization chart

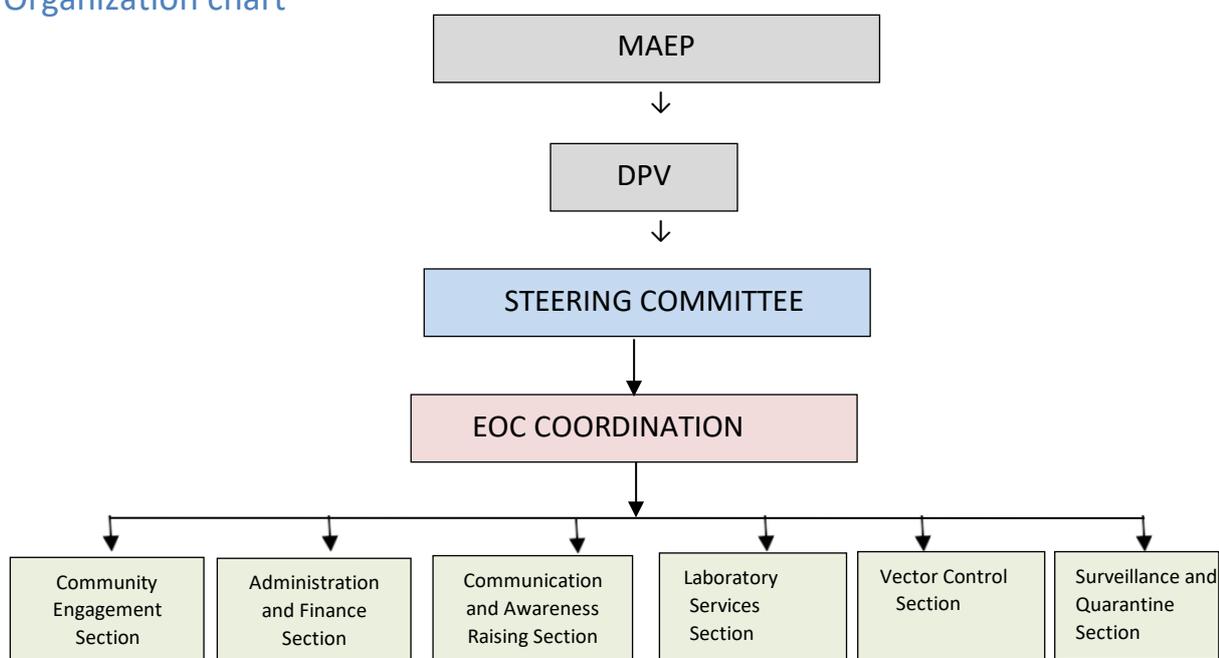


Figure 1: Organization chart for the EOC

## Human resources

### Core competencies

**Coordination:** Specialist in agronomy (educated to at least master's degree level with at least 5 years' experience in the plant protection field) with crisis management skills and an understanding of government institutions

**Administration and Finance:** Accountant manager with logistics and project administration/management skills

**Surveillance:** Agronomists, plant pathologists, entomologists, epidemiologists

**Vector Control:** Entomologists, agronomists

**Quarantine:** Agronomists, plant pathologists, phytosanitary inspectors

**Laboratory Services:** Entomologists, plant pathologists, virologists, laboratory technicians

**Community Engagement:** Sociologists, agroeconomists, agronomists, producers, extension agents

**Other skills:** Breeders, weed scientists, etc.

### Roles and responsibilities

#### Permanent staff

1. **EOC coordinator:** Responsible for coordinating activities across the different sections
2. **Heads of section:**
  - The *Head of Administration and Finance* is responsible for managing the human, material, and financial resources of the EOC. This head of section is assisted by one human resources manager, who is responsible for personnel, and one accountant (for finances).
  - The *Head of Surveillance and Quarantine* leads and supervises activities around surveillance and zone quarantine. He or she is assisted by three management-level employees who are responsible for data collection and sampling.
  - The *Head of Vector Control* directs and supervises integrated control activities that target the vectors of cassava viral diseases. He or she is assisted by two colleagues who ensure that vector control measures are implemented.
  - The *Head of Laboratory Services* ensures that laboratory analysis protocols are correctly applied. He or she is assisted by two laboratory technicians.
  - The *Head of Communication and Awareness Raising* supervises the creation of communication tools and materials and their distribution.
  - The *Head of Community Engagement* leads and coordinates grassroots activities in communities concerned by the management of cassava viral diseases.
3. **Agricultural technicians:** Carry out activities in the field
4. **Laboratory technicians:** Carry out laboratory work

## Temporary staff

1. **Supervisors:** Oversee activities in the field
2. **Agricultural and laboratory technicians:** Take samples and monitor the outbreak in the field
3. **Community liaison workers:** Ensure that information and instructions reach the heart of the community
4. **Students, interns, and volunteers:** Support the field teams
5. **Drivers:** Transport staff and equipment and ensure connections

## Recruitment strategy

**Coordinator:** Must be a specialist in agronomy (educated to at least master's degree level with at least 5 years' experience in the plant protection field) and be a good leader

**Heads of section and other specialist managers:** Must be specialists in agronomy for surveillance, vector control, quarantine, and laboratory services, and in sociology for community engagement

**Work technicians:** Must be senior agricultural technicians or have a bachelor's degree in agronomy

**Laboratory technicians:** Must be senior technicians or laboratory engineers

## Recruitment procedure

Recruitment will be carried out by an independent firm using the terms of reference drawn up by the Ministry of Agriculture. A call for expressions of interest will be published and candidates will submit their applications to the Ministry. These applications will be examined by the appointed recruitment firm. A test will be organized for candidates and those who pass will be interviewed by the firm with a view to employment.

The EOC Coordinator, the Head of Surveillance and Quarantine, and the Head of Vector Control may be appointed by the Ministry of Agriculture. These positions will not be subject to the recruitment procedure.

The remaining EOC staff will be recruited via the recruitment procedure.

## Training

Skills gaps and qualification gaps may be assessed through tests administered by specialist firms. Skills will be evaluated annually.

Existing staff and new employees will receive training on crisis management at the start of the project. Capacity building sessions will be organized every two years for all staff.

In addition, new employees will take part in a practical training program that covers recognizing viral disease symptoms in the field, taking samples, storing samples until they reach the laboratory, and so on.

## Financial and material resources

### Financial needs<sup>1</sup>

The total budget required to set up and operate the EOC is estimated as 7,000,000 USD. This budget covers a five-year period, as shown in the table below.

Table 4: Provisional five-year budget to set up and operate the EOC (USD)

Activity	2019	2020	2021	2022	2023	TOTAL
EOC setup	2,301,100	382,500	54,500	54,500	54,500	2,847,100
EOC operations	0	0	996,640	934,640	959,640	2,890,920
Contingency budget	0	0	420,660	420,660	420,660	1,261,980
<b>Total budget</b>	<b>2,301,100</b>	<b>382,500</b>	<b>1,471,800</b>	<b>1,409,800</b>	<b>1,434,800</b>	<b>7,000,000</b>

### Material needs

Material resources required for EOC setup and operations:

- Construction of a building to house the offices, a laboratory, a meeting room, and a library
- Office equipment (furniture, IT equipment, office supplies, Wi-Fi)
- Rolling stock (vehicles, motorbikes)
- Laboratory equipment (PCF, centrifuges, refrigerators)
- Relay generators
- Laboratory consumables and reagents
- Diagnostic equipment

Material resources needed during an outbreak:

- Surveying equipment (sampling equipment, cameras, GPS)
- Quarantine equipment (2 greenhouses including one level 2)
- Freezer blocks for storing samples
- Disease elimination and vector control equipment

Operating costs (fuel, telephone line, internet connection, electricity, water)

<sup>1</sup> See the budget framework for the action plan for more details.

## Resource management plan

The EOC must have administrative autonomy. The EOC Coordinator will authorize expenditure, while the Head of Administration and Finance is responsible for managing the human, material, and financial resources allocated to the EOC. The latter must implement a system for the ongoing management and maintenance of materials acquired, with a regular inventory of resources.

In the event of an outbreak, resources must be acquired following emergency procedures (direct agreement). Sections that need to carry out a task will indicate their requirements in terms of reference, which must be approved by the EOC Coordinator. The EOC should have a procedural manual for resource management and internal and external audits.

The Togolese State will ensure that the project's achievements and assets are sustainable by allocating a budget to the organization that will take over project activities.

## Partnerships

- **Funders:** BMGF (USA), DFID (UK), EU, FAO, AfDB, WB, USAID, WAEMU, WADB, ECOWAS, Togolese State. Their role is to make financial resources available to the EOC.
- **Technical expertise during and after an outbreak:** IITA, WAVE, Dalberg, ITRA, DPV, Directorate of Agricultural Seeds and Plants (DSP), Ecole Supérieure of Agronomy (ESA)/University of Lomé, ICAT, NGOs, and national consultants. Their role will be to provide technical support to the EOC.

## IV. EMERGENCY RESPONSE PLAN

### Actions to be taken before an outbreak

	Risk analysis and definition of risk level	Planning / prevention	Surveillance	Prevention	Community engagement	Partnerships
What	<ol style="list-style-type: none"> <li>1. Set up a system for collecting information from growers</li> <li>2. Periodically collect samples and analyze them in the laboratory, targeting ACMV, EACMCV, EACMV-UG, and possibly CBSV and CBSV-UG</li> <li>3. Pre-evaluate the extent of the disease (surface areas infected, zones under attack) and evaluate the alert threshold</li> </ol>	<ol style="list-style-type: none"> <li>1. Build capacity among specialists</li> <li>2. Share information</li> <li>3. Raise awareness among stakeholders</li> <li>4. Train technical agents and growers/grower organizations</li> <li>5. Select tolerant planting material</li> <li>6. Acquire laboratory equipment and reagents</li> </ol>	<ol style="list-style-type: none"> <li>1. Periodic surveys and analyses</li> <li>2. Internal vigilance system</li> </ol>	<ol style="list-style-type: none"> <li>1. Border controls</li> <li>2. Use tolerant and certified planting material</li> <li>3. Raise awareness of the risks of introducing disease and of preventive measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Meetings / awareness-raising sessions to share experience</li> <li>2. Community vigilance systems</li> <li>3. Use of tolerant and certified material</li> </ol>	<ol style="list-style-type: none"> <li>1. Technical and financial support for study trips, skills transfer, technical facilities, EOC operations, rolling stock, etc.</li> </ol>
Who	<ul style="list-style-type: none"> <li>- Growers/grower organizations</li> <li>- Phytosanitary inspectors and other DPV officers</li> <li>- Seed inspectors</li> </ul>	<ul style="list-style-type: none"> <li>- EOC Operational Coordination</li> </ul>	<ul style="list-style-type: none"> <li>- Phytosanitary inspectors and other DPV officers, support and advice officers, customs officers, growers, and village plant protection teams</li> </ul>	<ul style="list-style-type: none"> <li>- Seed and phytosanitary inspectors, support and advice officers, DPV officers, customs officers, growers of tolerant and certified planting material, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Village chiefs and public figures</li> <li>- Opinion leaders (village development committees, village neighborhood committees, youth leaders, religious leaders, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>- Financial partners: BMGF, DFID, FAO, WB, AfDB, USAID, WADB, WAEMU</li> <li>- Technical partners: ITRA, ICAT, DPV, DSP, WAVE, ESA, IITA, NGOs</li> </ul>

	<ul style="list-style-type: none"> <li>- Extension agents</li> <li>- Researchers</li> </ul>		<ul style="list-style-type: none"> <li>- Head of Surveillance</li> </ul>	<ul style="list-style-type: none"> <li>- The Head of Surveillance coordinates prevention activities</li> </ul>	<ul style="list-style-type: none"> <li>- Leaders of village teams</li> <li>- The Head of Community Engagement is responsible for this activity</li> </ul>	<ul style="list-style-type: none"> <li>- EOC Operational Coordination is responsible for developing partnerships</li> </ul>
<b>How</b>	<ol style="list-style-type: none"> <li>1. PCR, RCA, cloning, and sequencing will be used to analyze samples</li> <li>2. Simulation methods will be used for the pre-evaluation and to determine the alert threshold</li> </ol>	<ol style="list-style-type: none"> <li>1. Develop training modules</li> <li>2. Produce communication materials</li> <li>3. Screen planting material</li> </ol>	<ol style="list-style-type: none"> <li>1. Evaluate the health status of representative samples from fields</li> <li>2. Conduct surveys and interviews to collect evidence from growers and agricultural advisers</li> </ol>	<ol style="list-style-type: none"> <li>1. Share information (reports) between the Head of Surveillance and actors involved in prevention</li> <li>2. Raise growers' awareness and make certified planting material available</li> </ol>	<ol style="list-style-type: none"> <li>1. Active participation in community activities</li> <li>2. Organized visits to fields</li> <li>3. Communication</li> </ol>	<ol style="list-style-type: none"> <li>1. Meetings</li> <li>2. Draft bills</li> <li>3. Campaigns, lobbying, etc.</li> </ol>
<b>When</b>	<ul style="list-style-type: none"> <li>- Twice yearly (3 and 6 months after planting)</li> </ul>	<ul style="list-style-type: none"> <li>- Before the start of the crop year</li> </ul>	<ul style="list-style-type: none"> <li>- Samples will be taken and survey forms completed on a weekly basis</li> <li>- Smartphone images can be sent and evidence collected at any time</li> </ul>	<ul style="list-style-type: none"> <li>- At all times for border control</li> <li>- Before and during the crop year for awareness raising and use of tolerant and certified planting material</li> </ul>	<ul style="list-style-type: none"> <li>- Periodically (up to 6 times/year) for organized visits to fields</li> <li>- At any time for community days</li> <li>- At the start of the crop year for use of tolerant and certified material</li> </ul>	<ul style="list-style-type: none"> <li>- Before the start of the crop year (January–March)</li> </ul>

## Actions to be taken in the event of an outbreak

	Detection, identification, and confirmation	Response, containment, quarantine, and elimination	Activation of the response system	System operation	Evaluation of response
What	<ol style="list-style-type: none"> <li>1. Visual observation method (to spot abnormalities in the field)</li> <li>2. Alerting system</li> <li>3. Virological analysis (ELISA test or PCR) for detection and confirmation</li> </ol>	<ol style="list-style-type: none"> <li>1. Containment (of infected areas)</li> <li>2. Quarantining areas under attack (ban on trading planting material from infected areas to disease-free areas)</li> <li>3. Threat management (introduce tolerant or resistant material into areas under attack, destroy infected fields with compensation for growers, and vector control)</li> </ol>	<ol style="list-style-type: none"> <li>1. Convene rapid intervention teams and put forward a response plan</li> <li>2. Provide rapid intervention teams with human, financial, and logistical resources (vehicles, motorcycles, fuel, sampling equipment)</li> <li>3. Inform growers that a viral threat has been confirmed and of the response measures to take</li> <li>4. Set aside a budget for compensating affected growers, etc.</li> </ol>	<ol style="list-style-type: none"> <li>1. The EOC Coordinator's decision is sent to the rapid intervention team</li> <li>2. Organize consultation meetings for all stakeholders</li> <li>3. Mobilize financial, material, and human resources</li> </ol>	<ol style="list-style-type: none"> <li>1. The response plan will be evaluated at every stage (forming the rapid intervention team, making financial and material resources available, accomplishing tasks in the field, etc.)</li> </ol>

<p><b>Who</b></p>	<ul style="list-style-type: none"> <li>- Growers</li> <li>- Technicians (agricultural advisers, senior technicians, CAGs, researchers, DPV officers, lab technicians, etc.)</li> <li>- Results are reported to the DPV/EOC</li> </ul>	<ul style="list-style-type: none"> <li>- The DPV is responsible for quarantining the infected area and eliminating the threat by setting up rapid intervention teams and working together with other actors (grower organizations, local authorities, opinion leaders, extension agents, NGOs, researchers, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>- The Ministry of Agriculture / EOC is responsible for activating the system</li> <li>- Rapid intervention teams involve the following actors: DPV, ICAT, researchers (ITRA, WAVE-UL), local authorities, growers and grower organizations, compensation committees, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- EOC Head of Administration and Finance</li> </ul>	<ul style="list-style-type: none"> <li>- The EOC Surveillance and Quarantine Section does the evaluations</li> <li>- A member of the Steering Committee and a DPV/Ministry of Agriculture officer will take part in the evaluations</li> </ul>
<p><b>How</b></p>	<ol style="list-style-type: none"> <li>1. The threat is detected and identified after observing the field and is confirmed through laboratory analysis of samples taken</li> <li>2. The grower observes symptoms of the disease in the field</li> <li>3. The technicians carry out an identification visit and take specimens from the field</li> </ol>	<ol style="list-style-type: none"> <li>1. Information, training, awareness raising, and empowerment meetings with the different actors covering tasks to be carried out</li> <li>2. Integrated vector control</li> <li>3. The ban on trading material will be enforced through internal quarantine measures</li> </ol>	<ol style="list-style-type: none"> <li>1. The EOC Coordinator makes the decision to involve the rapid intervention team</li> <li>2. The intervention teams are convened by the EOC Coordinator</li> <li>3. The EOC Coordinator and Head of Administration and Finance provide the rapid intervention teams with human, financial, and logistical resources</li> </ol>	<ol style="list-style-type: none"> <li>1. Share information with all stakeholders via progress reports</li> <li>2. Deploy human, material, and financial resources to outbreak areas</li> <li>3. Evaluate reports and make readjustment decisions at each stage of the response</li> </ol>	<ol style="list-style-type: none"> <li>1. Evaluations are conducted as follows: <ul style="list-style-type: none"> <li>- Create survey forms</li> <li>- Administer questionnaires</li> <li>- Conduct field interviews</li> <li>- Go through survey forms and analyze results</li> <li>- Produce evaluation reports</li> </ul> </li> </ol>

	<ol style="list-style-type: none"> <li>4. Information is relayed to the competent authorities (Ministry of Agriculture, etc.) via a detailed report</li> <li>5. Information will be relayed to the infected areas via awareness-raising sessions, town criers, rural radio stations, and using communication materials</li> <li>6. The disease will be confirmed in the virology laboratory of the WAVE project (at ESA) or ITRA</li> </ol>				<ol style="list-style-type: none"> <li>2. After the evaluation reports are analyzed, future actions taken as part of the response system may be reoriented</li> </ol>
<b>When</b>	<ul style="list-style-type: none"> <li>- An outbreak will be declared when the alert threshold is reached</li> <li>- Maximum period of 2 weeks between observation in the field and laboratory confirmation</li> </ul>	<ul style="list-style-type: none"> <li>- Until no new infected areas appear following the different interventions and there is a significant reduction in prevalence</li> <li>- Quarantine will end in the following season (12 months, i.e. normal cassava production cycle)</li> </ul>	<ul style="list-style-type: none"> <li>- As soon as the EOC Coordinator is sent a detailed disease report confirming the threat</li> </ul>	<ul style="list-style-type: none"> <li>- The response system is deactivated once it is observed in the field that disease symptoms are below harmful levels and the laboratory confirms the viral load has reduced to an acceptable level</li> </ul>	<ul style="list-style-type: none"> <li>- Evaluations take place at every stage of the response and at the end</li> </ul>

## Phytosanitary measures

### Laws and regulations on biosecurity

**Border control:** ECOWAS Regulation C/REG.4/05/2008 on harmonization of the rules governing quality control, certification and marketing of plant seeds and seedlings in ECOWAS region; WAEMU Regulation No. 03/2007/CM/UEMOA concerning setting up a regional biosecurity program in WAEMU; and national Law No. 96-007/PR concerning plant protection.

These laws and regulations are in force in the country. The EOC's activities must take place within the context of these existing laws.

**Control of the movement of cuttings within the country:** In general, all infected planting material intercepted at the border is systematically destroyed. The phytosanitary inspector informs his or her superior, who makes the necessary arrangements.

### Seed systems

#### **Certification / production and propagation of cassava cuttings:**

- Organize and regulate the production system for tolerant and certified planting material
- Encourage mass production of tolerant and certified planting material
- Establish and support an assurance system for the production of tolerant and certified planting material

#### **Best practice for handling cuttings:**

- Sanitation through *in vitro* culture
- Have nurseries
- Avoid damaging knots
- Reduce the time between taking cuttings and planting them

#### **Mode of transport for cuttings:**

- Transport stems in bundles from the nursery to the field

#### **Distribution of cuttings:**

- Create a formal system for tracking planting material from the production site to the planting site
- Regulate the distribution of tolerant and certified planting material

### Vector control

#### **Treatment of whitefly:**

Chemical products exist, but the non-chemical method is not available in Togo at this time.

- Explore alternative control methods
- Strengthen sustainable control methods

**Mechanism for managing infected plants:**

- Uproot infected plants and destroy them using the slash-and-burn method under a technician's supervision

**CMD-tolerant varieties:** Gbazekoute, yellow flesh (TMS 01/0379; TMS 01/1224), TMS 96/0409

**Distribution of resistant varieties:**

Resistant varieties are given to a cuttings producer, who supplies other growers from a nursery.

## Communication & awareness raising

**Stakeholder groups to train**

- Producers
- Agricultural technicians
- Phytosanitary inspectors

**Types of training and awareness campaign**

- Workshops
- Public meetings
- Field visits
- Farmers' field schools
- Demonstration plots
- Radio and TV programs
- Showing and publishing video clips

**Channels of communication**

- Rural radio stations
- Television
- Smartphones
- Extension materials (posters and factsheets)

**Frequency of engagement**

- Education: Organize sketches in school environments, produce and display leaflets
- Community engagement: Encourage dialogue between growers
- The training/awareness campaign will run at least once per year

## V. OPERATIONAL STRATEGY

### Strategy implementation plan

#### Roadmap<sup>2</sup>

##### Strategic objectives:

**Objective 1:** Introduce a collective governance system for cassava virus outbreaks in Togo

**Objective 2:** Introduce a rapid diagnosis system for cassava viral diseases in Togo

**Objective 3:** Develop effective methods of combating cassava viral diseases and their vectors

**Objective 4:** Set up an information and communications system for all cassava diseases, particularly viruses

**Objective 5:** Build the technical and material capacities of actors in the prevention, surveillance, and response system

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<sup>2</sup> See details in the table below.

Table 4: Roadmap for the action plan

Strategic objective	Activity	2019		2020		2021		2022		2023	
		S1	S2								
Objective 1: Introduce a collective governance system for cassava virus outbreaks in Togo	1. Raise awareness among the authorities	x									
	2. Organize national workshops	x									
	3. Draw up regulatory texts for the EOC	x									
	4. Form the Emergency Operations Center (EOC)	x									
	5. Form the committees and surveillance units of the EOC	x									
	6. Activate quarantine units at borders	x									
	7. Organize a national workshop with cassava sector stakeholders	x									
Objective 2: Introduce a rapid diagnosis, prevention, and response system for cassava viral diseases in Togo	1. Map and georeference production zones		x	x							
	2. Continue mapping and georeferencing cassava viral diseases		x				x				x
	3. Evaluate the extent of national and cross-border traffic in cassava cuttings		x								
	4. Collect and characterize national cassava germplasm		x	x	x	x					
	5. Operationalize the surveillance of viral disease threats in cassava production zones	x	x	x	x	x	x	x	x	x	x
Objective 3: Develop effective methods of combating cassava viral disease threats and their vectors	1. Establish production standards for resistant and sanitized cassava planting material	x	x								
	2. Draw up an inspection protocol for cassava planting material		x								
	3. Operationalize a sanitation and <i>in vitro</i> conservation unit for cassava germplasm in Togo	x	x	x	x	x	x	x	x	x	x

	4. Explore alternative vector control methods and strengthen sustainable vector control methods	x	x	x	x	x	x	x	x	x	x
	5. Operationalize the quarantine system		x	x	x	x	x	x	x	x	x
	6. Create a georeferenced list of cassava seed producers										
<b>Objective 4: Set up an information and communications system for all cassava diseases, particularly viruses</b>	1. Produce radio/TV programs	x	x	x	x	x	x	x	x	x	x
	2. Organize awareness roadshows	x	x	x	x	x	x	x	x	x	x
	3. Produce documentaries	x	x	x	x	x	x	x	x	x	x
	4. Create posters, factsheets, and leaflets	x	x	x	x	x	x	x	x	x	x
<b>Objective 5: Build the technical and material capacities of actors in the prevention, surveillance, and response system</b>	1. Train members of the EOC Committee and surveillance units		x				x				x
	2. Train seed inspectors		x				x				x
	3. Train seed producers		x				x				x
	4. Train phytosanitary inspectors and phytosanitary control officers		x				x				x
	5. Train agricultural surveillance officers		x				x				x
	6. Train cassava growers		x	x	x	x	x	x	x	x	x
	7. Train technicians and researchers		x	x	x	x	x	x	x	x	x
	8. Acquire additional equipment for operations in the <i>in vitro</i> culture laboratory	x	x								
	9. Acquire equipment and materials for phytosanitary field inspections	x	x								
	10. Acquire additional equipment for operations in the virology laboratory	x	x								
	11. Acquire mini greenhouses, including one that has security level 2, for quarantine services	x	x								
	12. Acquire consumables and reagents for operations in the virology laboratory	x	x								
	13. Build and furnish the EOC office	x	x								
	14. Train specialist cassava breeders		x	x	x	x	x	x			

## Resource mobilization plan

**Budget required to set up the EOC and for its annual operations:** Setting up the EOC requires funding of 3,500,000 USD. For operations, 150,000 USD will be needed in Years 1 and 2 and 600,000 USD in Years 3, 4, and 5.

### Order of priority for funding needs:

*Immediate funding needs:* offices, laboratories, greenhouses, rolling stock, laboratory equipment, field materials, border controls, awareness-raising workshops and meetings.

*Medium-term needs:* Production and distribution of healthy and tolerant planting material, refresher training and training leading to a qualification.

### Financial actors with expected percentage from each group:

- Funders such as BMGF, DFID-UK, ECOWAS, IsDB, the World Bank, USAID, AUF, AfDB, FAO, and WAEMU will be approached to contribute 70%
- The Togolese State will contribute 20% through the national budget (DPV/MAEP)
- Counterparts from cassava producers will amount to 5% of the budget
- The private sector will be approached to contribute 5% of the budget.

### Key short-term and medium-term activities to ensure the EOC is fully funded:

Preliminary studies by WAVE have confirmed that the dangerous form of mosaic virus is present in Togo.

- The first activity will involve getting political decision-makers' attention via publications and radio/TV communications on the Ugandan form of mosaic virus (EACMV-UG) found in the Plateaux region of Togo and on the serious threat from CBSD in East Africa, which is gradually moving towards West Africa
- The action plan approved by the Minister for Agriculture will then be included in a West and Central African network to tackle cassava viral diseases at national and sub-regional level
- The plan will then be submitted to funders for financial support, and to the government of each country for budget votes on an effective and sustainable response to these diseases.

## Implementation risk management

No.	Description of risk	Probability of occurrence	Mitigating actions
01	Government fails to commit to supporting implementation of the action plan	High	<ul style="list-style-type: none"><li>- Arrange regular appointments with government representatives</li><li>- Hold individual meetings with each group of actors in the sector</li></ul>
02	Limited sources of funding	Moderate	<ul style="list-style-type: none"><li>- Use the WAVE network to access other sources of funding</li><li>- Use other institutions such as FAO, CORAF, WAEMU, AfDB, etc.</li></ul>

03	Limited national capacity to implement the action plan	Moderate	<ul style="list-style-type: none"> <li>- Focus on training and building the capacities of national stakeholders</li> <li>- Go on research trips/missions for transfer of knowledge</li> </ul>
04	Little attention from media companies	Low	<ul style="list-style-type: none"> <li>- No action</li> </ul>
05	Little engagement from growers, agricultural advisers, and opinion leaders	Moderate	<ul style="list-style-type: none"> <li>- Actively involve growers, extension agents, and opinion leaders in recognition and strategies to combat cassava viral diseases</li> </ul>

## Monitoring and evaluation plan

Intervention logic	Results	Activity	Monitoring indicators	Monitoring frequency	Responsibility for monitoring	Audit sources	Assumptions	Evaluation frequency	Responsibility for evaluation
SO1: Introduce a collective governance system for cassava virus outbreaks in Togo	A collective governance system for cassava virus outbreaks is introduced in Togo	1. Raise awareness among the authorities	A report and media support	First six months of project	WAVE, DPV, MAEP	Reports from EOC/Ministries	Favorable economic and social environment  An independent firm	Every six months	Independent experts
		2. Organize national workshops	Workshop report	First six months of project	WAVE				
		3. Draw up regulatory texts for the EOC	Regulatory text	First six months of project	DPV, MAEP				
		4. Form the Emergency Operations Center (EOC)	Committee list and internal regulation	First six months of project	WAVE				
		5. Form the committees and surveillance units of the EOC	List of committees and their internal regulations	First six months of project	DPV, MAEP				
		6. Activate quarantine units at borders	Unit activation report	First six months of project	WAVE				
		7. Organize a national workshop with cassava sector stakeholders	National workshop report	First six months of project	DPV, MAEP				
SO2: Introduce a rapid diagnosis, prevention, and response system for cassava viral diseases in Togo	A rapid diagnosis, prevention, and response system is introduced for cassava viral diseases in Togo	1. Map and georeference production zones	Cassava production zones are mapped and georeferenced in an activity report	Yearly	EOC, WAVE, DPV	Reports from EOC/Ministries	Favorable economic and social environment  Or independent firm	Per project	Independent experts
		2. Continue mapping and georeferencing	Zones threatened by viral diseases are mapped and	Yearly	DPV, MAEP				

		viral threats to cassava	georeferenced in an activity report						
		3. Evaluate the extent of national and cross-border traffic in cassava cuttings	National and cross-border traffic in cuttings (planting material) is evaluated in an activity report						
		4. Collect and characterize national cassava germplasm	Number of national cassava germplasms (accessions) collected and characterized	Twice yearly	DPV, WAVE, university, ITRA				
		5. Operationalize the surveillance of viral disease threats in cassava production zones	Surveillance of viral disease threats in cassava production zones is operational	Yearly	University of Kara partners				
SO3: Develop effective methods of combating cassava viral disease threats and their vectors	Effective methods of combating cassava viral disease threats and their vectors are developed	1. Establish production standards for resistant and sanitized cassava planting material	Production standards for resistant and sanitized cassava planting material are established	Yearly	WAVE, universities, ITRA	Reports from EOC/Ministries	Favorable economic and social environment	Per project	Independent experts
		2. Draw up an inspection protocol for cassava planting material	An inspection protocol for cassava planting material is drawn up	At end of study	WAVE, universities, ITRA		Or independent firm		
		3. Operationalize a sanitation and <i>in vitro</i> conservation unit for cassava germplasm in Togo	A sanitation and <i>in vitro</i> conservation unit for cassava germplasm is operational in Togo	At end of study	WAVE, universities, ITRA				

		4. Explore alternative vector control methods and strengthen sustainable vector control methods	Alternative control methods are explored in an activity report	At end of production	EOC, WAVE, ITRA				
		5. Operationalize the quarantine system	The quarantine system is operational in an activity report	Yearly	EOC, DPV, WAVE, INRAB				
		6. Create a georeferenced list of cassava seed producers	A georeferenced list of cassava seed producers is created	Yearly	EOC, WAVE, universities, ITRA				
<b>SO4: Set up an information and communications system for all cassava diseases, particularly viruses</b>	An information and communications system for all cassava diseases, particularly viruses, is set up	1. Produce radio/TV programs	Radio and TV programs are produced	Every three months	EOC, WAVE, DPV	Reports from EOC/Ministries	Favorable economic and social environment  Or independent firm	Every six months	Independent experts
		2. Organize awareness roadshows	Awareness roadshows are organized	Twice yearly	EOC, WAVE, ITRA				
		3. Produce documentaries	Documentaries are produced						
		4. Create posters, factsheets, and leaflets	Posters, factsheets, and leaflets are created	Yearly	WAVE, DPV				
		1. Train members of the EOC Committee and surveillance units	Members of the EOC Committee and surveillance units are trained	Yearly	WAVE, DPV, MAEP	Reports from EOC/Ministries			

<p style="text-align: center;"><b>S05: Build the technical and material capacities of actors in the prevention, surveillance, and response system</b></p>	<p style="text-align: center;">Build the technical and material capacities of actors in the prevention, surveillance, and response system</p>	2. Train seed inspectors	Number of seed inspectors trained	Yearly	WAVE, DPV, MAEP		<p style="text-align: center;">Favorable economic and social environment</p> <p style="text-align: center;">Or independent firm</p>	<p style="text-align: center;">Mid-term evaluation and impact assessment</p> <p style="text-align: center;">Final evaluation</p>	<p style="text-align: center;">Independent experts</p> <p style="text-align: center;">Internal experts</p>
		3. Train seed producers	Number of seed producers trained	Twice yearly	WAVE, DPV, ITRA, MAEP				
		4. Train phytosanitary inspectors and phytosanitary control officers	Number of phytosanitary inspectors and phytosanitary control officers trained	Yearly	WAVE, DPV, MAEP				
		5. Train agricultural surveillance officers	Number of agricultural surveillance officers trained	Twice yearly	WAVE, DPV, ICAT, MAEP				
		6. Train cassava growers	Cassava growers are trained	Yearly	WAVE, DPV, ITRA, MAEP				
		7. Train technicians and researchers	Number of technicians and researchers trained	Yearly	WAVE, DPV, ITRA, MAEP				
		8. Acquire additional equipment for operations in the <i>in vitro</i> culture laboratory	Additional equipment is acquired for operations in the <i>in vitro</i> culture laboratory	Start of project activities	WAVE, DPV, MAEP				
		9. Acquire equipment and materials for phytosanitary field inspections	Equipment and materials for inspections are acquired	Start of project activities	WAVE, DPV, MAEP				

		10. Acquire additional equipment for operations in the virology laboratory	Additional equipment is acquired for operations in the virology laboratory	Start of project activities	WAVE, DPV, MAEP				
		11. Acquire mini greenhouses, including one that has security level 2, for quarantine services	Mini greenhouses, including one that has security level 2, are acquired for quarantine services	Start of project activities	WAVE, DPV, MAEP				
		12. Acquire consumables and reagents for operations in the virology laboratory	Consumables and reagents are acquired for operations in the virology laboratory	Start of project activities	WAVE, DPV, MAEP				
		13. Build and furnish the EOC office	The EOC office is built and furnished	Start of project activities	WAVE, DPV, MAEP				
		14. Train specialist cassava breeders	Number of specialist cassava breeders trained	Yearly	WAVE, DPV, ITRA, MAEP				