



**FELIX HOUPHOUËT-BOIGNY UNIVERSITY**

West African Virus Epidemiology  
(WAVE)

for root & tuber crops



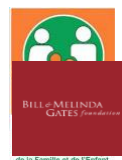
# **NATIONAL ACTION PLAN TO MITIGATE CASSAVA VIRAL DISEASES FOR SUSTAINABLE FOOD SECURITY**

**WEST AFRICAN VIRUS EPIDEMIOLOGY FOR FOOD SECURITY**

**(WAVE)**



**DECEMBER 2018**



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## LIST OF ABBREVIATIONS

- **ADFMA:** Agence de Développement de la Filière Manioc (Cassava Sector Development Agency)
- **AfDB:** African Development Bank
- **ANADER:** Agence Nationale d'Appui au Développement Rural (National Agency to Support Rural Development)
- **ANASEMCI:** Association Nationale des Semenciers de Côte d'Ivoire (National Association of Seed Producers of Côte d'Ivoire)
- **AU:** African Union
- **BMGF:** Bill & Melinda Gates Foundation
- **CBSD:** Cassava brown streak disease
- **CBSV:** Cassava brown streak virus
- **CGU-MVM:** Comité de gestion urgente des maladies virales du manioc (Emergency Management Committee for Cassava Viral Diseases)
- **CIDCA:** China International Development Cooperation Agency
- **CIRAD:** French Agricultural Research Center for International Development
- **CMD:** Cassava mosaic disease
- **CMV:** Cassava mosaic virus
- **CNAVI-CI:** Coordination Nationale des Acteurs du Vivrier de Côte d'Ivoire (National Coordination of Food Production Actors in Côte d'Ivoire)
- **CNRA:** Centre National de Recherche Agronomique (National Agricultural Research Center)
- **COEFA:** Coopérative Espoir des Femmes Ahizi d'Attoutou (Hope Cooperative of Aizi Women in Attoutou)
- **COOP-CA SCAMCI:** Société Coopérative Agricole Moaye de Côte d'Ivoire (Moaye Agricultural Cooperative Society of Côte d'Ivoire)
- **COVAPCI:** Coopérative des Vendeuses d'Attieké et de Poissons de Côte d'Ivoire (Cooperative of Women Attiekie and Fish Sellers in Côte d'Ivoire)
- **CSRS:** Swiss Centre for Scientific Research
- **DFID:** Department for International Development

- **DPVCQ:** Direction de Protection des Végétaux, du contrôle et de la qualité (Directorate for Plant Protection, Control, and Quality)
- **DPVSA:** Direction des Productions Vivrières et de la Sécurité Alimentaire (Directorate for Food Production and Food Safety)
- **ECOWAS:** Economic Community of West African States
- **ESA:** Ecole Supérieure of Agriculture
- **EU:** European Union
- **FAO:** Food and Agriculture Organization of the United Nations
- **FARA:** Forum for Agricultural Research in Africa
- **FCIAD:** Fonds Compétitif pour l'Innovation Agricole Durable (Competitive Fund for Sustainable Agricultural Innovation)
- **FENASCOVICI:** Fédération Nationale des Sociétés Coopératives de Vivrier de Côte d'Ivoire (National Federation of Food Production Cooperatives in Côte d'Ivoire)
- **FIRCA:** Fonds Interprofessionnel pour la Recherche et le Conseil Agricole (Interbranch Fund for Agricultural Research and Advice)
- **FONARI:** Fonds d'Appui à la Recherche et à l'Innovation (Fund to Support Research and Innovation)
- **GIZ:** Gesellschaft für Internationale Zusammenarbeit
- **IDRC:** International Development Research Centre
- **IFAD:** International Fund for Agricultural Development
- **INPHB:** Institut National Polytechnique Houphouët-Boigny (Houphouët-Boigny National Polytechnic Institute)
- **IRD:** Institut de recherche pour le développement (French Research Institute for Development)
- **I2T:** Société Ivoirienne de Technologie Tropicale (Ivorian Society of Tropical Technology)
- **JICA:** Japan International Cooperation Agency
- **M&E:** Monitoring and evaluation
- **MESRS:** Ministry of Higher Education and Scientific Research
- **MFFE:** Ministry of Women, Families, and Children
- **MINADER:** Ministry of Agriculture and Rural Development
- **MINEDD:** Ministry of the Environment and Sustainable Development

- **OCPV:** Office d'aide à la Commercialisation des Produits Vivriers (Food Product Marketing Aid Office)
- **PACIR:** Programme d'appui au commerce et à l'intégration régional (Support Program for Trade and Regional Integration)
- **PASDFMA-CI:** Programme d'Appui à la Structuration et au Développement de la Filière manioc en Côte d'Ivoire (Support Program for Organization and Development of the Cassava Sector in Côte d'Ivoire)
- **PASRES:** Programme d'Appui Stratégique à la Recherche Scientifique (Strategic Support Program for Scientific Research)
- **PNIA:** Plan National d'Investissements Agricoles (National Plan on Agricultural Investment)
- **PROPAC:** Plateforme Régionale des Organisations Paysannes d'Afrique Centrale (Regional Platform for Central African Producers Organizations)
- **RD:** Regional Director
- **SCOOPROMID COOP-CA:** Société Coopérative des Producteurs de Manioc de l'Indenié Djuablin avec Conseil d'Administration (Cooperative Society of Cassava Growers in Indenié Djuablin with Board of Directors)
- **SCOOPS PTMD:** Société Coopérative Simplifiée des Producteurs et Transformateurs de manioc du Denguélé (Simplified Cooperative Society of Cassava Producers and Processors in Denguélé)
- **SNRA:** Système National de la Recherche Agricole (National Agricultural Research System)
- **UNDP:** United Nations Development Programme
- **USAID:** United States Agency for International Development
- **VCA4D:** Value Chain Analysis for Development
- **WAAPP:** West Africa Agricultural Productivity Program
- **WAEMU:** West African Economic and Monetary Union
- **WATP:** West Africa Agricultural Transformation Project
- **WB:** World Bank

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**The Minister**

No. \_\_\_\_\_/MINADER/CAB/DGPSA/DPVCQ

Abidjan

**To**

**Dr. Nick Austin**  
**Director of Agricultural**  
**Development**  
**The Bill & Melinda Gates**  
**Foundation**  
**Seattle, USA**

**Re: Letter in support of the WAVE initiative to implement  
an action plan on cassava viral diseases in Côte d'Ivoire**

Dear Dr. Austin,

Cassava is a strategic crop for food security and a way out of poverty for the people of Côte d'Ivoire. The crop has made a real contribution to social progress and is strengthening gender equality.

In recent years, cassava production in the country has increased, rising from 3 million metric tons in 2011 to over 4 million in 2017. Cassava is the second most common food crop in the country, and it plays a role in food security and the fight against poverty.

However, the production of cassava in Côte d'Ivoire faces significant challenges from enemies and diseases such as African cassava mosaic disease (CMD). It is threatened by cassava brown streak disease (CBSD), which is currently present in East and Central Africa. These viral diseases cause a substantial drop in yield with a negative impact on populations' economic and social lives.

Through its Ministry of Agriculture and Rural Development (MINADER), Côte d'Ivoire supports a strategy of integrated control, phytosanitary surveillance, alerting, and rapid response to tackle cassava viral diseases, particularly CBSD.

On behalf of the Ivorian Government, I would like to take this opportunity to thank the Bill & Melinda Gates Foundation for your support of the WAVE initiative.

Finally, I confirm that Côte d'Ivoire is committed to supporting the WAVE program, with priority given to tackling the cassava viral diseases present in Côte d'Ivoire and to preventing cassava brown streak virus.

Yours sincerely,

**Minister for Agriculture  
and Rural Development**

**Mamadou Sangafoa Coulibaly**

## EXECUTIVE SUMMARY

Cassava is a strategic crop for food security and a way out of poverty for the people of Côte d'Ivoire. The crop has made a real contribution to social progress and is strengthening gender equality. However, the production of cassava in Côte d'Ivoire faces significant challenges from enemies and diseases such as African cassava mosaic disease (CMD). It is threatened by cassava brown streak disease (CBSD), which is currently present in East and Central Africa. These viral diseases cause a substantial drop in yield with a negative impact on populations' economic and social lives.

This action plan on cassava viral diseases in Côte d'Ivoire will be overseen by an Emergency Management Committee for Cassava Viral Diseases (CGU-MVM), allowing us to tackle these threats. The plan is anchored in the Directorate for Plant Protection, Control, and Quality (DPVCQ) of the Ministry of Agriculture, and it aims to guarantee households and smallholders sustainable food security and a reliable income through better management of cassava viral diseases by 2023.

The Ministry of Agriculture is certain to be a major source of support for this action plan. The West African Virus Epidemiology (WAVE) program will likewise play a key role.

The strategic plan must be implemented to significantly limit the spread of cassava virus outbreaks to West Africa and specifically Côte d'Ivoire. These actions will boost cassava production and preserve attieke, which is much loved by the populations of Côte d'Ivoire and the wider West African subregion. As such, the plan will reduce the harmful socioeconomic impact of the viruses both nationally and regionally.

This action plan to mitigate cassava viral diseases has four specific objectives:

1. Set up a coordination unit for activities relating to the cassava viral disease action plan;
2. Strengthen the capacity of the Côte d'Ivoire agricultural system to tackle cassava viral diseases;
3. Set up an integrated national phytosanitary system;
4. Develop operational mechanisms for alerting and responding to a plant health crisis.

The plan also has 58 activities necessary for its execution. These will be led by national specialists. However, if needed, the CGU-MVM will call on international experts.

The action plan will be supported by the Côte d'Ivoire government, funders (BMGF and DFID), the country's technical and financial partners, and bilateral and multilateral cooperation.



## I. BACKGROUND AND JUSTIFICATION

### Current national situation on cassava viral diseases

#### Economic and social importance

Cassava (*Manihot esculenta*) is a euphorbia plant native to Central America, the Caribbean, and northern Brazil. It was introduced to West Africa by the Portuguese in the 16<sup>th</sup> century and to East Africa in the 18<sup>th</sup> century, before spreading to the whole continent and to South Asia during explorations in the 18<sup>th</sup> and 19<sup>th</sup> centuries, which was encouraged by the colonial authorities (Onwueme, 2002). Over the course of the 20<sup>th</sup> century, cassava became an important food in all tropical countries (FAO).

Cassava is the third largest source of carbohydrates for human consumption and has become a subsistence and cash crop for farmers. Hardy and resilient, it has established itself as a strategic crop for food security and poverty reduction (Kouakou et al., 2015). It is a staple food for almost 800 million people in the world, including almost 500 million Africans (FAO, 2013). The tuberous roots and leaves of cassava are mainly used for human food. A number of traditional and industrial cassava products (gari, tapioca, fermented paste, attieke, chips, starch, flour, beer, liquor, toothpaste, alcohol, etc.) are consumed and traded in the region (Mendez del Villar et al., 2017).

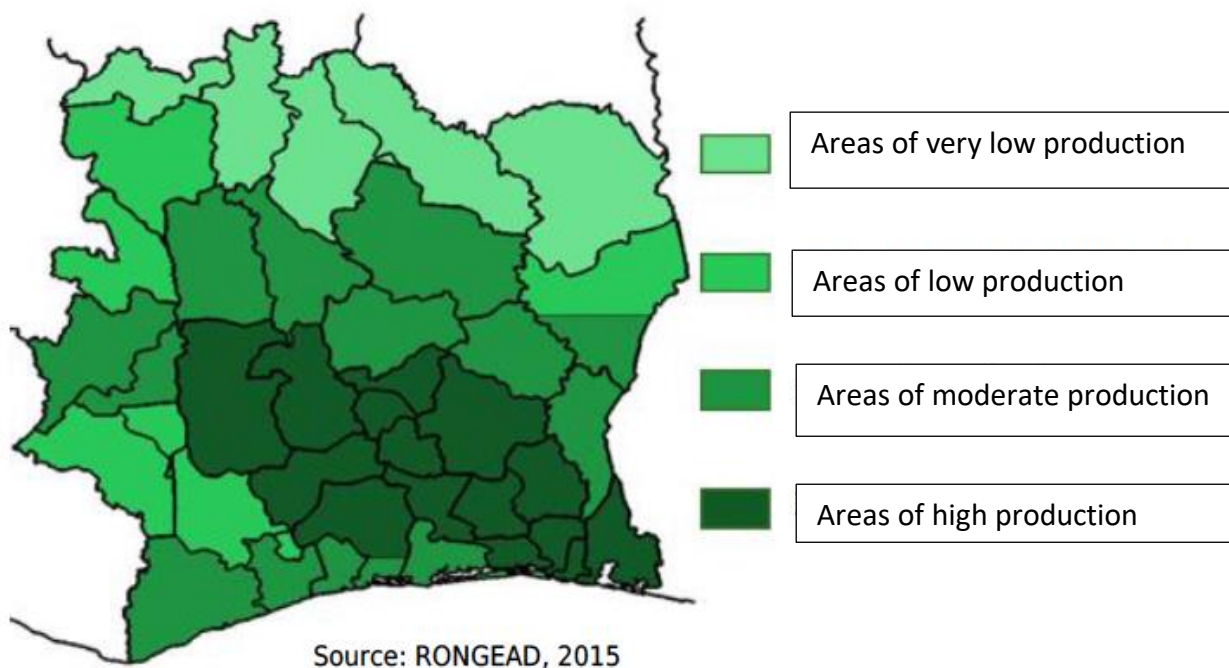
Worldwide production of cassava was about 270 million metric tons in 2017, and Africa's share has increased from 50% to 57% over the last twenty years, reaching 156 million tons. Production in Africa has doubled in 20 years because of progress in some countries, particularly Angola, Ghana, Mozambique, Malawi, Côte d'Ivoire, and Sierra Leone. However, Nigeria remains the largest cassava producer in the world with about 55 million tons in 2017 (FAO, 2017).

Although Africa is the largest producer of cassava worldwide (57%), its mean yield is unfortunately the lowest with an average of 10 metric tons/ha, compared with Asia which had a yield of 21.34 t/ha in 2016 (FAOSTAT, 2017). This is despite the fact that Africa has highly productive varieties with a potential that can exceed 40 t/ha. The low yield can be explained by several factors, including a lack of high-quality planting material (cuttings), failure to respect crop protocols, and the impact of viral diseases. According to estimates, yield needs to exceed 25 t/ha by 2050 in order to cover the immediate dietary and industrial needs related to cassava production, because of the growing population and increasing urbanization.

According to Elisabeth Atangana, President of the Regional Platform for Central African Producers Organizations (PROPAC), "cassava is a goldmine that could significantly help reduce poverty in sub-Saharan Africa, guarantee employment for women and young people, and reduce excessive dependence on agricultural imports."

In Côte d'Ivoire, cassava is the second largest food crop produced and consumed after yam. It is grown throughout the country, but especially in the southeast, south, west and center (N'zué et al., 2014). Like most Ivorian agriculture, cassava is a crop grown by families and smallholders. With a surface area of about 500,000 ha for cassava, and a mean surface area of 0.5 ha per family farm, it can be estimated that there are almost 1 million cassava growers in Côte d'Ivoire. Annual production is 4.547 million metric tons (Mendez del Villar et al., 2017) with a very low average yield of 6.5 to 7 tons per hectare.

Figure 1: Main production zones for cassava in Côte d'Ivoire



Cassava production grew at a rate of 8.5% per year between 2005 and 2015. The most common varieties cultivated in the main production areas are Yace and IAC (attieke) and Bonoua (foutou). Varieties resulting from agricultural research are present but to a lesser extent, including Bocou 1, Bocou 2, Bocou 3 (CNRA), Yavo (TME07), Olékanga (TME09), and TMS (IITA) (ANADER, 2017).

### Summary of current situation

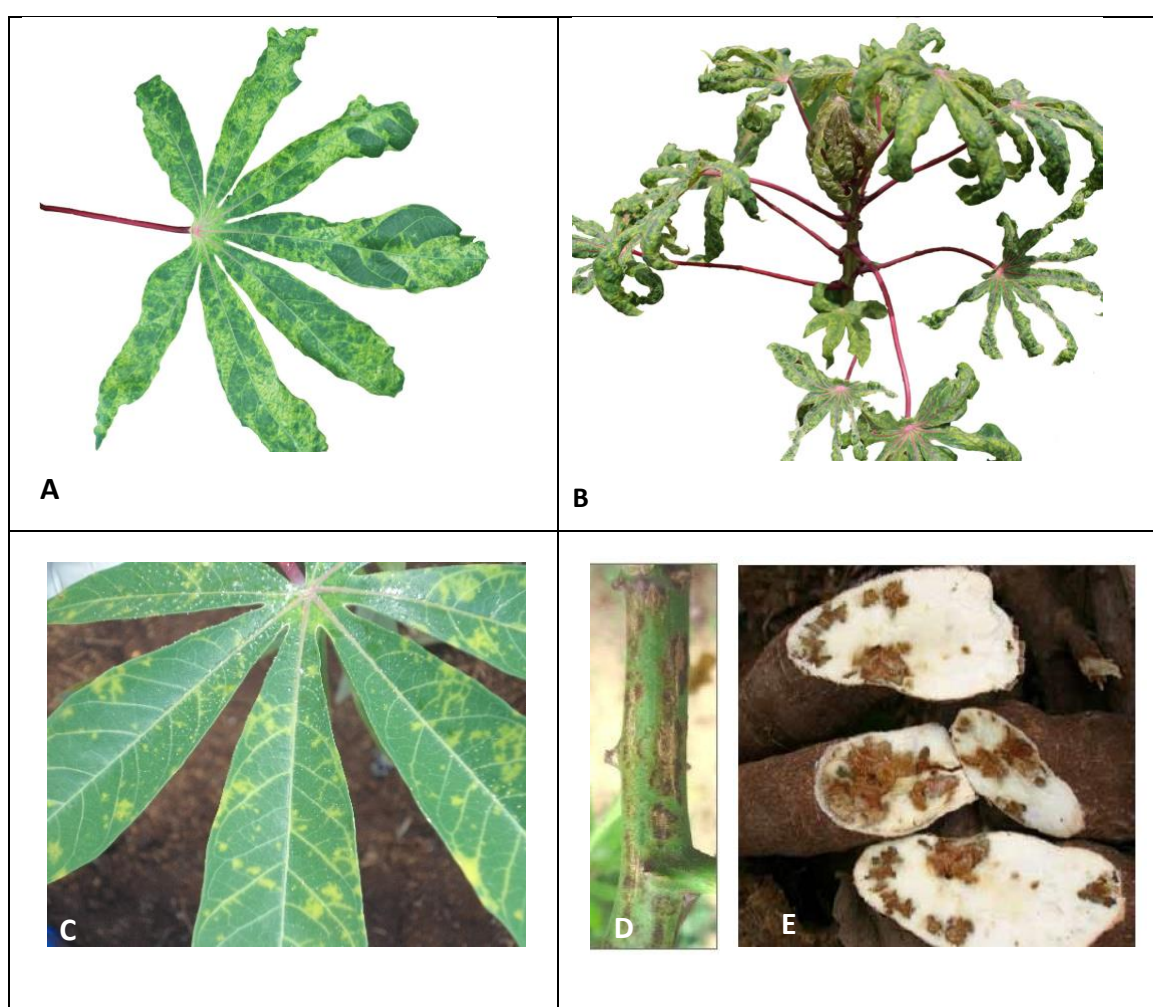
Despite cassava's many positive qualities, its cultivation is constrained by several factors that affect its productivity. Of these, African cassava mosaic disease (CMD) and cassava brown streak disease (CBSD) cause the most damage (Patil and Fauquet, 2009).

Because of its geographical distribution, CMD is the biggest constraint on production. Caused by geminiviruses (ACMV and EACMV), it is one of the most widespread cassava diseases in Africa. Almost all traditional cassava varieties on the African continent are susceptible to this

disease (Moses et al., 2007). It can cause yield losses of 40–70%, resulting in an annual economic loss of 2 to 3 billion USD in sub-Saharan Africa (Patil et Fauquet, 2009).

In addition, cassava brown streak disease (CBSD) – which originated in East Africa – has recently appeared in Central Africa and is heading for West Africa. This disease, caused by the potyviruses CBSV and UCBSV (Alicai et al., 2007; Mbanzibwa et al., 2011), is a genuine threat to cassava production with yield losses that can reach 90% or even 100%. Both viral diseases are transmitted by whitefly (*Bemisia tabaci*) and also spread by humans who trade and use infected cassava cuttings to establish new fields (Patil et al., 2015). Although CBSD has not yet been identified in Côte d'Ivoire, close epidemiological surveillance is absolutely essential.

Figure 2: Symptoms of cassava viral diseases – African cassava mosaic disease (A, B); cassava brown streak disease (C, D)



To halt the progress of CBSD and effectively combat the African CMD already present in West and Central Africa, African researchers have set up a program called West African Virus Epidemiology for Food Security (WAVE) in seven West and Central African countries, with support from the Bill & Melinda Gates Foundation (BMGF) in the USA and the UK Department for International Development (DFID). Coordinated by Côte d'Ivoire (Félix Houphouët-Boigny

University), this program aims to contribute to food security by managing viral diseases in root and tuber plants, taking a collaborative and regional approach.

Phase 1 of the program involved Burkina Faso, Côte d'Ivoire, Ghana, Togo, Benin, Nigeria, and the Democratic Republic of Congo. A second phase of WAVE should extend to five other countries: Cameroon, Gabon, Liberia, Sierra Leone, and Guinea-Conakry.

To slow the spread of CBSD and have better control of CMD, the regional WAVE program urges governments of its host countries to introduce a surveillance system, an early warning system, and an action plan on CBSD. As such, under the auspices of the Ministry of Agriculture and Rural Development and in collaboration with the Directorate for Plant Protection, Control, and Quality (DPVCQ), WAVE-Côte d'Ivoire has organized a workshop to develop a national action plan to mitigate cassava viral diseases for sustainable food security in Côte d'Ivoire.

## Mapping of key stakeholders

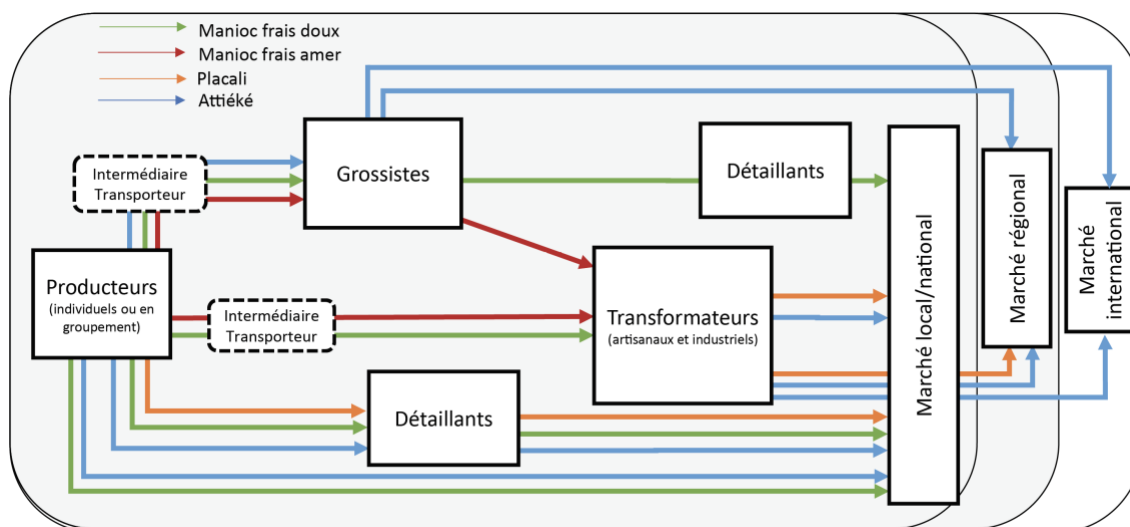
### Cassava value chain

The cassava value chain accounts for about 12% of agricultural GDP and 2.8% of national GDP. Its markets are diverse, with short distribution channels to supply local markets, longer channels for national markets, and exportation to the West African subregion and further afield (primarily Europe).

From production to processing to sales, cassava is socially profitable for its stakeholders. Most stakeholders are women, who account for 80% of growers, 100% of processors, and 90% of sellers (Mendez del Villar et al., 2017). The cassava sector guarantees *jobs for women and young people and reduces excessive dependence on importing food and agricultural products*. Women are therefore key players in the cassava value chain.

Processing creates new opportunities to add value, helping to increase farm incomes and reduce poverty in rural areas. This situation has led to a deluge of national and international initiatives to boost cassava production and processing. The trend is towards industrialization of the cassava sector at all levels of the value chain. However, processing most often remains small scale and traditional, although semi-industrial and industrial units have sprung up in the center of the country (Mendez del Villar et al., 2017).

Figure 3: Main flows in the cassava value chain in Côte d'Ivoire (VCA4D, 2018)



Factors for optimum productivity, such as good agricultural practice and the use of improved high-yield varieties, have been well publicized. Despite this, yield is still far below expectations because of a major constraint which does not get enough attention, namely viral diseases. The cassava value chain has a positive impact on food security, gender equality, and living conditions (Perrin, 2015).

Table 1: Mapping of key stakeholders

	Research	Inputs	Production	Storage and transport	Processing	Marketing and promotion
<b>Public</b>	- Félix Houphouët - Boigny University - WAVE - Nangui Abrogoua University - Péléforo Gbon Coulibaly University - Jean Lorougnon Guédé University - ESA (INPHB) - CNRA - FIRCA - I2T	- ANADER - FIRCA - CNRA - WAVE	- Ministry of Agriculture - PNIA	- Sitarail	- I2T	- OCPV

<b>Private</b>	<ul style="list-style-type: none"> <li>- CSRS</li> <li>- WAAPP</li> <li>- IRD</li> <li>- CIRAD</li> <li>- CORAF</li> </ul>	<ul style="list-style-type: none"> <li>- Nursery owners</li> <li>- ANASEMCI</li> <li>- Plant protection companies</li> <li>- Plant protection product distributors</li> <li>- Chemical fertilizer companies</li> <li>- Biofertilizer manufacturers</li> </ul>	<ul style="list-style-type: none"> <li>- Farmers</li> <li>- Cooperatives</li> <li>- Nestlé</li> <li>- PASDFMA-CI</li> <li>- Producers</li> <li>- SCOOPROMID</li> <li>- COOP-CA</li> <li>- SCOOPS PTMD</li> <li>- Canaan Group International Association</li> <li>- FENASCOVICI</li> <li>- CNAVI-CI</li> <li>- Guro women's cooperatives</li> </ul>	<ul style="list-style-type: none"> <li>- Transporters/lorries</li> <li>- Wholesalers</li> <li>- Tarp-covered vehicles</li> </ul>	<ul style="list-style-type: none"> <li>- COEFA</li> <li>- SCOOPS PTMD processors</li> <li>- Transformagri</li> <li>- Akatine</li> <li>- Nestlé</li> </ul>	<ul style="list-style-type: none"> <li>- PACIR</li> <li>- COOP-CA</li> <li>- SCAMCI</li> <li>- Bakers' trade association</li> <li>- Aqua Eburnie</li> <li>- GIZ</li> <li>- Chigata NGO</li> <li>- Akatine</li> <li>- Cote d'Ivoire Agro Trading</li> <li>- Nestlé</li> <li>- CNAVI-CI</li> <li>- Ivoire Manioc</li> <li>- Guro women's cooperatives</li> </ul>
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## Other relevant actors

Table 2: List of other relevant actors involved in the cassava value chain

Government	Private sector	Civil society organizations / NGOs	Bilateral and multilateral partners	Other
<ul style="list-style-type: none"> <li>- Ministry of Agriculture</li> <li>- MESRS</li> <li>- Ministry of Commerce</li> <li>- MINEDD</li> <li>- Ministry of Industry</li> <li>- MFFE</li> </ul>	<ul style="list-style-type: none"> <li>- Nestlé Côte d'Ivoire</li> <li>- Bakers</li> <li>- Industrial banks</li> <li>- Agricultural banks</li> </ul>	<ul style="list-style-type: none"> <li>- COEFA</li> <li>- ADFMA</li> </ul>	<ul style="list-style-type: none"> <li>- World Bank</li> <li>- AfDB</li> <li>- FAO</li> <li>- DFID</li> <li>- USAID</li> <li>- JICA</li> <li>- CIDCA</li> <li>- GIZ</li> <li>- IFAD</li> <li>- ECOWAS</li> <li>- WAEMU</li> <li>- EU</li> </ul>	<ul style="list-style-type: none"> <li>- BMGF</li> </ul>

## Risk assessment

Table 3: Main threats to cassava and risk level categorization

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				
Root rot	High	Yield loss	Moderate	Food insecurity
Anthraxnose	Moderate	Poor-quality propagation materials	Moderate	Food insecurity



<i>Cercospora</i> leaf spot	Moderate	Slight impact on yield	Moderate	Food insecurity
Bacterial threats				
Cassava bacterial blight	High	Yield loss	High	Food insecurity
Bacterial necrosis	High	Yield loss	High	Food insecurity
Bacterial wilt	High	Yield loss	High	Food insecurity
Viral threats				
African cassava mosaic	Moderate	Yield loss	High	Food insecurity Increased risk of poverty and famine
Cassava brown streak	High	Yield loss Destruction of plantations Very rapid spread	High	Food insecurity Increased risk of poverty and famine Destroys the economic fabric of farming households
Other threats				
<i>CBSD-like</i>	High	Yield loss Destruction of plantations Very rapid spread	High	Food insecurity Increased risk of poverty and famine Destroys the economic fabric of farming households

## Current risk management process

Each geographical department has a phytosanitary surveillance and early warning team or committee. These are made up of:

- Growers
- Agricultural surveillance officers
- Agricultural projects
- Plant health service officers
- The Regional Director (RD) or Departmental Director (DD)
- Agricultural research organizations and institutions
- Farmers' organizations and agricultural development NGOs, etc.

Each team is under the authority of the Regional or Departmental Director of Agriculture, who reports to the DPVCQ.

Members of the phytosanitary surveillance and early warning team perform the necessary tasks during their day-to-day activities, as follows:

- **Growers** carry out regular surveys of their agricultural plots and other crops in the area, at all stages of crop development. If they observe eggs, larvae (caterpillars), moths, signs

of damage, or symptoms of disease, they escalate this information to local agricultural surveillance officers.

- **Agricultural surveillance officers** (from ANADER, projects, NGOs, and other organizations) also carry out observations as part of their day-to-day activities. They assess the infected plots reported by growers. The Head of ANADER (or other Departmental Heads of agricultural sector surveillance) sends a report to the Ministry of Agriculture Regional or Departmental Director.
- **Plant health service officers from Ministry of Agriculture RDs and DDs** assess infected plots with the surveillance services and report to their superiors.
- The **Ministry of Agriculture Regional or Departmental Director** contacts the agricultural research organization involved in the department, so it can confirm the observations made by ANADER. For localized attacks, appropriate plant protection measures are recommended (mechanical, plant protection products, etc.). The RD or DD informs the Directorate for Plant Protection, Control, and Quality (DPVCQ).
- The **agricultural research organization (CNRA or other)**, if there is one in the region, takes samples of eggs, larvae (caterpillars), pupae (chrysalises) or moths, or infected plants, and formally identifies the pest or disease. It sends a report to the Ministry of Agriculture Regional or Departmental Director and/or the Director of the DPVCQ.
- The **Director of the DPVCQ** informs the Minister for Agriculture of the situation and suggests that the Minister for Agriculture bring the issue to the Government's attention in the Council of Ministers. He or she reports the necessary data on the web portal of the International Plant Protection Convention (IPPC). He or releases plant protection treatments to all or part of the national territory, if necessary, following the Government's agreement. The Director of the DPVCQ can directly summon the research and agricultural surveillance services to take various actions.

Ongoing action against other agricultural threats:

1. **Management of *Achaea catocaloides* caterpillars on cacao trees.** For large-scale (national) attacks, the Minister for Agriculture took the issue to the Council of Ministers, proposing one or more solutions.
  - The Government made the necessary resources available to the Ministry of Agriculture
  - The Director of the DPVCQ launched the response operations
  - The cost of the intervention was 145 million CFA francs or 290,000 USD
2. **Management of fruit flies on mango: 2015 case.** Since 2014, exports from Côte d'Ivoire have been threatened with a European embargo because of fruit flies. This parasite can cause production loss of 43% in the mango varieties exported. The State has therefore supported stakeholders in the sector to the tune of approximately two billion CFA francs over the past four years and it allocated funding of 65 billion CFA francs to the mango sector in 2017. In 2016, tackling fruit flies on mango cost the Côte d'Ivoire State 1.7 billion CFA francs.



## Gap assessment

### Strengths

Examining the current outbreak management process shows that Côte d'Ivoire has several assets when it comes to tackling cassava viral threats.

1. The Directorate for Plant Protection, Control, and Quality (DPVCQ) is represented throughout the country and at borders.
2. The DPVCQ is experienced in managing outbreaks of diseases such as cacao swollen shoot virus (CSSV) and pests such as *Achaea catocaloides* caterpillars.
3. The chain of command for the DPVCQ surveillance system is respected.
4. The farmer surveillance system covers the whole country.
5. The farmer surveillance system is active at reporting threats.
6. Growers trust the surveillance officers.
7. The capacities of surveillance officers are regularly boosted by research organizations.
8. There is a good scientific environment (laboratories, research centers, scientific collaboration, etc.).
9. The country's universities and research centers have cassava selection programs.
10. There is a collection of about 600 accessions of cassava, which could strengthen disease resistance characteristics.

### Weaknesses

Nonetheless, some weaknesses should be noted.

1. Leaders do not see the current cassava diseases as a threat to food security or the national economy.
2. The DPVCQ surveillance system is slowed down by red tape.
3. There is no formal system for cassava seed production.
4. There are not enough qualified human resources to select cassava varieties.
5. There is no overall systematic surveillance of cassava viral diseases.
6. Communication among stakeholders is lacking.
7. Growers and other stakeholders along the value chain have little awareness of the danger of cassava viral diseases.
8. The plant protection regulations are not sufficiently accessible to the population.
9. There are insufficient technical and financial resources for implementing an action plan.
10. There are no field tests (rapid tests) in Côte d'Ivoire that give an immediate result before laboratory confirmation of the disease.

## Key takeaways

An analysis of these points shows what is necessary to set up an emergency operations center for a cassava disease outbreak. The DPVCQ system for managing outbreaks needs to be improved by taking the following expeditious actions:

1. Coordinate initiatives and activities that relate to disease management and cassava production at departmental and national level.
2. Increase and improve collaboration between the organizations involved in the DPVCQ surveillance system to create synergy of action.
3. Produce a comprehensive map of diseases and threats present in the Côte d'Ivoire territory.
4. Provide surveillance and extension services with appropriate packages and materials for raising awareness of endemic and emerging cassava diseases.
5. Educate farmers on the risks of transporting non-certified planting materials and the danger posed by CBSD.
6. Apply appropriate phytosanitary measures and improve agricultural practice to avoid maintaining and spreading diseases.
7. Prepare growers to adopt adaptation strategies to compensate for the negative effects of cassava viral diseases.

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

### Vision

The national action plan aims to guarantee sustainable food security and a reliable income for households and smallholders through better management of cassava viral diseases by 2023.

### Strategic objectives

**Strategic objective 1: Set up a coordination unit for activities relating to the cassava viral disease action plan**

**Result 1.1: The government commits to supporting sustainable cassava production**

**Activity 1:** Explain the challenges posed by viral disease threats and the opportunities offered by WAVE's solutions during a meeting with the Minister for Agriculture

**Activity 2:** Get the action plan on cassava viral diseases approved

**Activity 3:** Obtain a letter of commitment to implementing the national action plan on cassava viral diseases, signed by the Minister for Agriculture

**Activity 4:** Obtain a memorandum to the Council of Ministers to get the Government's support

**Activity 5:** Obtain a ministerial decree to set up the Emergency Management Committee for Cassava Viral Diseases

**Result 1.2: The emergency operations center (CGU-MVM) is operational**

**Activity 1:** Institutionalize the CGU-MVM in legal terms

**Activity 2:** Draw up a person specification for CGU-MVM members

**Activity 3:** Develop a procedural manual describing mechanisms for collaboration between stakeholders

**Activity 4:** Appoint or recruit key human resources for the CGU-MVM

**Activity 5:** Set up and operationalize the CGU-MVM (sites, equipment, and operations)

**Result 1.3: Activities for managing cassava viral diseases are coordinated**

**Activity 1:** Draw up a list of experts involved in managing cassava viral diseases

**Activity 2:** Draw up a list of technical partners involved in activities to combat viral diseases

**Activity 3:** Organize monitoring meetings on the management of cassava viral diseases

**Activity 4:** Harmonize and plan the activities of the various stakeholders involved in tackling cassava viral diseases

**Activity 5:** Encourage and increase awareness among decision makers and traditional leaders

**Activity 6:** Hold regular committee meetings

**Activity 7:** Communicate about the proposed action plan to mitigate cassava viral diseases

**Strategic objective 2: Strengthen the capacity of the Côte d'Ivoire agricultural system to tackle cassava viral diseases**

**Result 2.1: A status report is produced covering programs and laboratories, structures for seed production, stakeholders' knowledge (perceptions) of diseases, and the material resources needed**

**Result 2.2: Stakeholders' capacities are strengthened following recommendations from the study**

**Activity 1:** Build laboratory capacities for *in vitro* culture

**Activity 2:** Increase laboratories' detection capacities

**Activity 3:** Build capacity among phytosanitary inspectors

**Activity 4:** Build growers' and seed producers' capacity to recognize cassava diseases

**Activity 5:** Build capacity among surveillance officers and extension agents

**Activity 6:** Build committee members' capacity to manage outbreaks, emergencies, and exceptional phytosanitary security situations

**Result 2.3: A critical mass of researchers and technicians is trained in the management of cassava viral diseases**

**Activity 1:** Evaluate and identify needs for training courses and skills training

**Activity 2:** Organize training courses and refresher training

**Activity 3:** Contribute to master's and PhD degrees in the field of cassava diseases

**Result 2.4: A communications strategy is developed on the impact of cassava viral diseases**

**Activity 1:** Form a communications team for viral diseases

**Activity 2:** Design and produce communications tools (audio, video, guide, leaflets, website, smartphone app, social media) in French and local languages

**Activity 3:** Carry out mass awareness-raising campaigns (forum, appeal)

**Activity 4:** Run information, education, and communication (IEC) campaigns among growers on phytosanitary standards, seed movement, and seed certification

**Activity 5:** Prepare growers to adopt adaptation strategies to compensate for the negative effects of cassava viral diseases

**Strategic objective 3: Set up an integrated national phytosanitary system**

**Result 3.1: A map of cassava viral disease locations is produced**

**Activity 1:** Map cassava production zones

**Activity 2:** Determine geographic distribution of viruses and vectors

**Result 3.2: Propagation of cassava cuttings is regulated**

**Activity 1:** Register cuttings producers and issue them with authorization

**Activity 2:** Identify production sites for planting material that are near production zones

**Activity 3:** Monitor propagation plots

**Activity 4:** Certify the quality of planting material

**Result 3.3: The circulation of planting material is regulated**

**Result 3.4: There is guaranteed production of disease-free planting material**

**Activity 1:** Maintain and store cassava germplasm

**Activity 2:** Control germplasm that enters the country

**Activity 3:** Sanitize elite planting material or the planting material preferred by farmers

**Activity 4:** Support the development of varieties that are resistant to emerging cassava viral diseases

**Activity 5:** Prepare growers to adopt adaptation strategies to compensate for the negative effects of cassava viral diseases

**Result 3.5: Good agricultural practice for managing cassava viral diseases becomes widespread**

**Activity 1:** Set up a plant health information network

**Activity 2:** Raise awareness of phytosanitary standards

**Activity 3:** Control vectors using biological control

**Strategic objective 4: Develop operational mechanisms for alerting and responding to a plant health crisis.**

**Result 4.1: The early warning and response system is activated through application of the instructions given by the CGU-MVM**

**Activity 1:** Coordinate initiatives and activities that relate to disease management and cassava production at departmental and national level

**Activity 2:** Strengthen the communications system

**Activity 3:** Seek additional funding

**Activity 4:** Deploy human and material resources in line with the action plan

**Activity 5:** Analyze the effectiveness of decisions made in response to the alert

**Result 4.2: Epidemiological data are collected and analyzed**

**Activity 1:** Acquire additional rolling stock

**Activity 2:** Intensify surveying activities

**Result 4.3: The threat is detected and confirmed by researchers**

**Activity 1:** Acquire additional consumables

**Activity 2:** Recruit a casual workforce

**Result 4.4: The intervention to mitigate the threat is effective**

**Activity 1:** Intensify phytosanitary inspections

**Activity 2:** Identify the origin of infected seeds and monitor planting material production sites

**Activity 3:** Contain areas of viral disease outbreak

**Activity 4:** Implement disease management measures

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

#### Institutional anchoring

The Côte d'Ivoire emergency operations center (EOC), known as the Emergency Management Committee for Cassava Viral Diseases (CGU-MVM), will be part of the Directorate for Plant Protection, Control, and Quality (DPVCQ) within the Ministry of Agriculture. It will not be an independent or autonomous structure within the Ministry. The CGU-MVM is a system that will be created to speed up the management of phytosanitary emergencies. Its operations will form part of the DPVCQ's activities and will draw on existing capacities, but if necessary, support staff will be appointed.

#### Governance

##### Mandate

##### **Mission:**

The mission of the CGU-MVM is to:

- Prevent outbreaks
- Manage outbreak situations, deploying operational units in emergencies
- Collect and analyze data on viral diseases
- Map cassava production zones
- Map viral threat zones
- Ensure smooth operations in the event of an outbreak
- Coordinate and supervise activities in the event of an outbreak
- Produce activity reports and status reports

##### **Legislative framework**

The ministerial decision to create the CGU-MVM will reference the Decree concerning organization of the Ministry of Agriculture and creating the DPVCQ.

How the CGU-MVM is organized and operates will be determined based on the DPVCQ's mission and operations. These ministerial laws and regulations could be amended to initially orient activities towards cassava cultivation and viral diseases, and then towards a broader vision covering other crops, diseases, and threats.

##### **Legal documents signed to confer legitimacy on the CGU-MVM**

A joint ministerial decision will be issued to confer legitimacy on the CGU-MVM.

## Organizational oversight

The following ministries are involved in the management policy:

**Ministry of Agriculture (currently MINADER).** The ministry responsible for agriculture at the time of writing this action plan is the Ministry of Agriculture and Rural Development (MINADER). It covers all matters relating to agricultural development and all matters concerning plant protection, which are devolved to the DPVCQ. As such, the DPVCQ is responsible for:

- Producing regulations on plant protection and ensuring they are implemented;
- Ensuring plant resources are protected and implementing programs to combat plant diseases;
- Ensuring phytosanitary conventions and agreements are complied with (e.g. IPPC);
- Inspecting the health of imported and exported plants and plant products;
- Organizing and coordinating health inspections and quality control of food products intended for consumption.

**Ministry of Higher Education and Scientific Research.** The ministry responsible for scientific research at the time of writing is the Ministry of Higher Education and Scientific Research (MESRS). It oversees the national system for agricultural research (SNRA) and is a vital link on the road to development in Côte d'Ivoire.

Of relevance, this ministry is responsible for:

- Planning agricultural research;
- Prioritizing research activities in Côte d'Ivoire;
- Coordinating all research activities;
- Funding research activities;
- Supporting the Ministry of Agriculture through agricultural research, particularly on plant health.

An important part of the key competencies required for the smooth operation of the CGU-MVM will come from this ministry via its research organizations.

**Ministry for Women, Families, and Children.** The Ministry for Women, Families, and Children is an important ministry for the cassava production and promotion system, because the main stakeholders in the cassava sector are women. Eighty percent (80%) of cassava growers are women, and this figure rises to 100% for processors and 90% for cassava sellers. As such, the cassava sector guarantees *jobs for women and young people and reduces excessive dependence on importing food and agricultural products*. Women therefore play a key role in the cassava value chain, and this ministry will be essential for raising awareness of risks and adaptation strategies.



# Organizational structure

## Departments and governing organs

The Emergency Management Committee for Cassava Viral Diseases (CGU-MVM) is made up as follows:

### Chairmanship:

- 1 Chair, who is the Director of the DPVCQ
- 1 Vice-Chair, who is a direct colleague of the Director of the DPVCQ

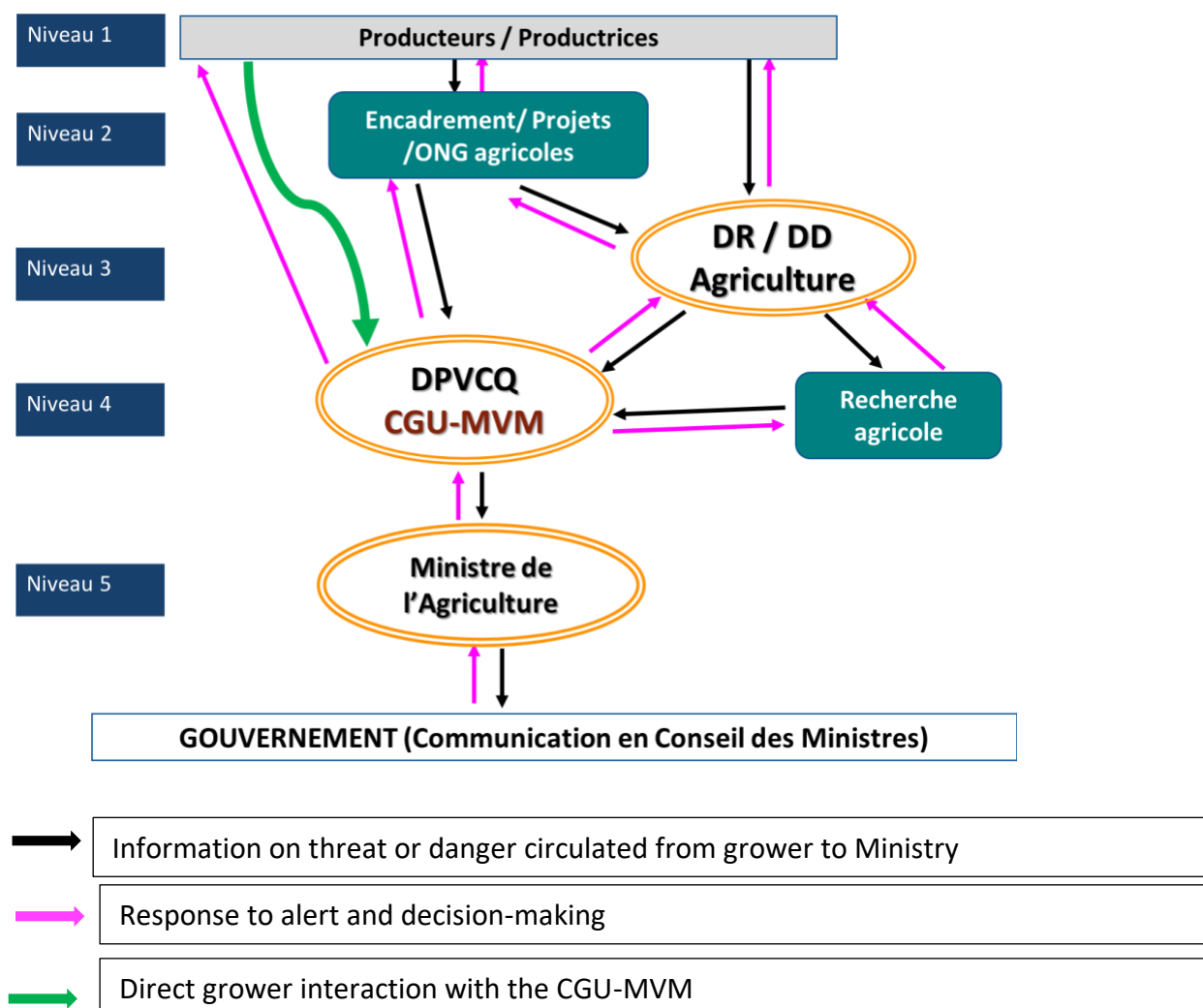
**Permanent secretariat**, from the DPVCQ.

**Members of the CGU-MVM:** Representatives of different stakeholder departments and organizations. They are divided into three units:

- Scientific and Technical Unit
- Administrative and Finance Unit
- Operations Unit

## Reporting and decision-making structure

Figure 4: Diagram of CGU-MVM phytosanitary surveillance system



Each geographical department has a phytosanitary surveillance and early warning team or committee. These are made up of:

- Growers
- Agricultural surveillance officers
- Agricultural projects
- Plant health service officers
- The Regional Director (RD) or Departmental Director (DD)
- Agricultural research organizations and institutions
- Farmers' organizations and agricultural development NGOs, etc.

Each team is under the authority of the Regional or Departmental Director of Agriculture, who reports to the DPVCQ.

Members of the phytosanitary surveillance and early warning team, which is set up in each department on the instructions of the DPVCQ Director, perform the necessary tasks during their day-to-day activities, as follows:

#### **LEVEL 1**

- **Growers** carry out regular surveys of their agricultural plots and primarily cassava fields at all stages of crop development. If symptoms of viral disease are observed, growers report this information to the local agricultural surveillance officers.

#### **LEVEL 2**

- **Agricultural surveillance officers** (from ANADER, projects, NGOs, and other organizations) also carry out observations as part of their day-to-day activities. They assess the plots containing diseased cassava plants (especially for CBSD) reported by growers. The Head of ANADER (or other Departmental Heads of agricultural sector surveillance) sends a report to the Ministry of Agriculture Regional or Departmental Director.

#### **LEVEL 3**

- **Plant health service officers from Ministry of Agriculture RDs and DDs** assess diseased plants (CBSD) in cassava plots with the surveillance services and report to their superiors.

#### **LEVEL 4**

- The **Ministry of Agriculture Regional or Departmental Director** contacts WAVE or the agricultural research organization involved in the department, so it can confirm the observations made by ANADER. Experts from WAVE or research organizations take

samples from the plant (leaf, stem, root) depending on the viral disease for formal identification of the causative agent. The WAVE program or research organization (CNRA, university, or other) involved in the region sends a report to the Ministry of Agriculture Regional or Departmental Director and/or the Director of the DPVCQ.

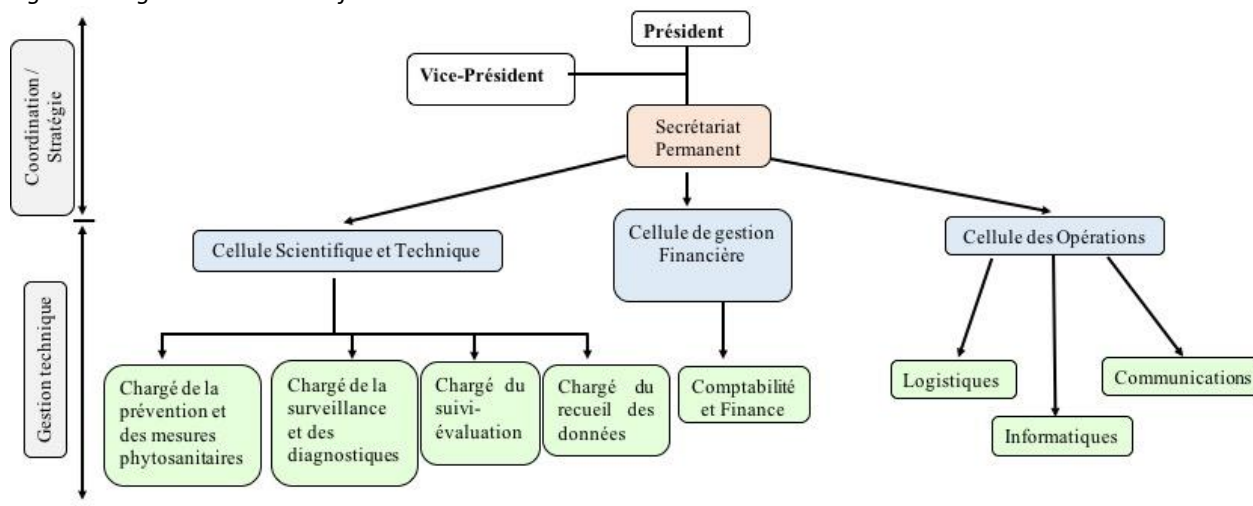
- **The RD or DD informs the Directorate for Plant Protection, Control, and Quality (DPVCQ)** of the disease and its extent. In the event of a CBSD outbreak or other unusual symptoms (different from African cassava mosaic disease), appropriate phytosanitary measures will be recommended by the DPVCQ in agreement with research organizations.

## LEVEL 5

- The **Director of the DPVCQ** informs the Minister for Agriculture of the situation and, depending on the risk level, suggests that the Minister for Agriculture bring the issue to the Government's attention in the Council of Ministers. He or she reports the necessary data on the web portal of the International Plant Protection Convention (IPPC). He or triggers the early warning and response system in all or part of the national territory, if necessary, following the Government's agreement. The Director of the DPVCQ can directly summon the research and agricultural surveillance services to take various actions.

## Organizational tree

Figure 5: Organizational tree of the CGU-MVM



The **Chair** calls meetings, coordinates all activities, and reports to the Minister and other stakeholders.

The **Vice-Chair** stands in for the Chair in the event of absence or unavailability.

The **permanent Secretary** prepares correspondence, sends letters, writes the minutes of meetings and ensures they are circulated, records information, and acts as an interface with stakeholders.

**Members of the CGU-MVM** take part in decision making and help to implement recommendations/activities within their departments and organizations.

- The **scientific unit** is responsible for surveillance, diagnosis, prevention, phytosanitary measures, management of epidemiological data, and monitoring and evaluation (M&E).
- The **financial management unit** is responsible for financial and accounting management.
- The **operations unit** is responsible for logistics, IT, and communications.

## Human resources

### Core competencies

The following core competencies have been identified:

- Specialist in agricultural crises
- Specialist in plant protection
- Specialist in socioeconomics
- Specialist in the production of planting material (cassava)
- Specialist in the organization of agricultural sectors (cassava)
- Specialist in cassava viral diseases
- Communications specialist
- Financial management specialist
- M&E specialist

In the event of an outbreak, national and international experts will be recruited on a temporary basis to support the members of the CGU-MVM.

### Roles and responsibilities

#### **Specialist in agricultural crises**

He/she must:

- Develop an overall risk management strategy based on the palette of tools available;
- Reinforce advice, training, and communication on risk management, in order to make growers, council operators, funding operators, and the sector more aware of their responsibilities;
- Encourage preventive initiatives;
- Join up the different systems and public interventions coherently based on the severity of the risk (to health, climate, and the economy) and the extent of losses;
- Endeavour to better distinguish between small risks, which are the responsibility of private operators in the sector, and large risks which should be covered by third parties (the State, insurers, and mutual funds).

#### **Specialist in plant protection**

He/she must:

- Provide support on matters relating to sustainable plant protection for the National Multidisciplinary Team;
- Advise members on risk prevention and plant protection, and ensure that plant protection and crop production are properly integrated into the work of the Multidisciplinary Team (working together with the specialist in planting material production);

- Support and apply conventions, agreements, and the distribution and use of pesticides;
- Periodically examine and evaluate the crop production and plant protection situation through studies and surveys;
- Help to plan and carry out the CGU-MVM's activities relating to plant protection;
- Liaise with universities, research organizations, and the National Agency for Rural Development in order to foster cooperation on plant protection;
- Plan and organize meetings, conferences, and seminars on plant protection;
- Carry out other related tasks as required.

### **Specialist in socioeconomics**

His/her tasks will be to:

- Collect the socioeconomic data needed to understand the relationships between the different actors in the cassava value chain, its production, and the threats it faces;
- Help to estimate and analyze the profit margins that cassava brings to direct operators in the sector and to the State;
- Identify the constraints faced by different actors in the sector;
- Help to evaluate and analyze the actual losses caused by cassava diseases and poor cultivation practices.

### **Specialist in the production of planting material (cassava)**

He/she must:

- Provide support on matters relating to sustainable crop production for the National Multidisciplinary Team, and more specifically:
- Advise members on the development of sustainable crop production, policies relating to seeds, and seed systems, and ensure that plant protection and crop production (working together with the plant production specialist) are properly integrated into the work of the Multidisciplinary Team;
- Periodically examine and evaluate the crop production situation through studies and surveys;
- Act as a liaison agent responsible for crop production and plant protection programs in the West African subregion, particularly with a view to feeding back subregional perspectives;
- Liaise with universities, research organizations, and the National Agency for Rural Development in order to foster cooperation on crop production;
- Plan and organize national and subregional meetings, conferences, and seminars on crop production;
- Carry out other related tasks as required.

### **Specialist in cassava viral diseases**

He/she:

- Has considerable scientific knowledge of plant viruses in general and cassava viruses in particular;
- Can create factsheets allowing symptoms of the virus to be recognized;
- Carries out activities to detect the presence of viruses and identify them.

### **Communications specialist**

For endemic diseases, he/she will have to communicate about the symptoms of viral diseases, the losses they cause, and methods for tackling them.

In the event of an outbreak, he/she must be able to:

- Respond quickly in a focused manner. The urgent nature of the situation should not provoke a “spontaneous” reaction that could undermine the CGU-MVM’s objectives for communication;
- Reassure and provide information, taking a quality and value creation approach;
- Implement a well-considered short-term strategy with a view to the medium and long term;
- Communicate consistently from the first actions until the end of the crisis.

### **Financial management specialist**

His/her main responsibilities are to:

- Oversee the implementation of a system for monitoring the spending and disbursement plan, which will aim to ensure that the resources required for the national action plan are available at the right time, when procedures are authorized to mobilize them;
- Invoice all expenses that must be paid to the national plan’s accounts;
- Sign requests for reimbursement of funds and interim financial reports;
- Supervise the financial and accounting management of the CGU-MVM by the local accountant;
- Ensure that procurement and payment procedures are strictly complied with;
- Coordinate contracts to be signed, together with the Public Procurement Unit;
- Coordinate with technical, financial, and implementation partners to ensure that financial reports are received and incorporated in accordance with these partners’ contractual obligations;
- Ensure that requirements are met for content and frequency of financial audits (internal and external) and ensure that the recommendations are followed;
- Carry out all other tasks relating to financial management.

### **M&E specialist**

The M&E Officer is responsible for:

- Developing and coordinating the M&E system in collaboration with his/her supervisors and other colleagues;
- Producing the M&E plan and adding it to the logical framework, setting up and updating a database, and writing annual work plans, three-monthly reports, the risk journal, problem logs, and mid-year and annual review reports;
- Monitoring activity planning within the project and with partners;
- Providing stakeholders with timely and relevant information on the project's progress;
- Ensuring close communication with all those involved in designing and implementing M&E:
  - Officers responsible for M&E of the project at central and decentralized level;
  - Stakeholder groups;
  - External consultants and field staff where applicable;
  - Members of external missions concerned by implementation of the project;
- Writing the following documents: M&E plan (produced and included in the logical framework), database (set up and updated), draft three-monthly reports, risk journal and problem logs, mid-year and annual review reports.

## Recruitment strategy

Recruitment will be skills-based.

**Committee members:** appointed through regulations by the Ministry of Agriculture

**Experts:** call for candidates following official procedures

## Training

**New employees:** Short training courses in very specific fields relating to the mission

**Existing staff:** Organize capacity-building sessions on outbreak management

## Financial and material resources

### Financial needs

The financial needs that are essential to committee operations include:

#### Capital expenditure

- Renovation, fitting out premises
- Maintaining and repairing material goods (rolling stock, etc.)
- Office furniture (chairs, tables, projector screens, etc.)
- Data center
- Vehicle purchases
- IT equipment (purchasing computers, printers, photocopiers, etc.)



- Lab equipment
- Communication equipment

### **Operating expenses**

- Office rental
- Office maintenance charges
- Electricity, insurance, water, communications
- Toll-free number
- Fuel and lubricant
- Allowances
- Cost of training
- Attendance fees
- Carrying out activities
- Internet connection
- Cost of social media marketing, workshops, conferences

### **Contingency budget**

- Vehicle hire
- Rolling stock maintenance costs
- Fuel and lubricant
- Consultant fees
- Cost of casual staff
- Mission expenses

### **Material needs**

- Rolling stock (vehicles, motorbikes, etc.)
- Smartphones
- IT equipment (computers, printers, photocopiers, etc.)
- Servers
- Data analysis software
- Personal protective equipment
- Office equipment and supplies
- Lab equipment and materials

### **Resource management plan**

The resource management plan will be based on the following elements:

#### **Procedures for allocating financial and material resources for the normal CGU-MVM operations**

- Follow the procedural manuals (financial management, allocation of resources, procurement, M&E, etc.) adopted in agreement with the funder.

## **Procedures necessary to ensure rapid allocation of financial and material resources in a crisis**

- Follow the procedural manuals

## **Order of priority for disbursement of resources for CGU-MVM operations**

- Office rental, equipment, and supplies
- Payment of mission expenses and allowances
- Fuel and lubricant
- Vehicle maintenance
- Communications (internet connection, telephone, etc.)

## **Mechanisms for financial and accounting control**

- Budgetary control
- External audit

## **Partnerships**

### **Funders supporting CGU-MVM operations**

- Bill & Melinda Gates Foundation (BMGF)
- UK Aid (Department for International Development)
- Cassava industry groups
- NGOs
- Local authorities
- Regional councils
- Charitable organizations
- Research and development projects
- Financial organizations: World Bank, AfDB

### **Groups of technical experts supporting the CGU-MVM during and after an outbreak**

- WAVE program
- Researchers
- Surveillance officers
- Platform of experts (think tank, consultants)

## IV. EMERGENCY RESPONSE PLAN

### Actions to be taken before an outbreak

Table 4: Actions to be taken before an outbreak

	Risk analysis and definition of risk level	Planning	Surveillance	Prevention	Community engagement	Partnerships
What	<ol style="list-style-type: none"> <li>1. A procedural manual for risk assessment and risk management should be produced by researchers and the DPVCQ. This manual will serve as a template for risk assessment and risk management for all other crop diseases and pests.</li> <li>2. Assess risk based on the damage to production. We have: <ol style="list-style-type: none"> <li>a. African cassava mosaic disease (ACMD). Already present and causes production losses of 40–70%. High risk.</li> <li>b. East African cassava mosaic disease (EACMD). Already present and found in combination with ACMD. Also high risk.</li> <li>c. East African cassava mosaic disease–Uganda (EACMD-UG). More virulent than the two previous types. Has never</li> </ol> </li> </ol>	<ol style="list-style-type: none"> <li>1. Inform, raise awareness</li> <li>2. Introduce a communications and resource mobilization strategy</li> <li>3. Train surveillance officers and extension agents</li> <li>4. Build capacity among scientists specializing in plant diseases and the production of planting material</li> <li>5. Strengthen the capacities of virology and molecular biology laboratories through equipment</li> <li>6. Mass production of planting material</li> </ol>	<ol style="list-style-type: none"> <li>1. Collect information and data from all those involved in the cassava value chain, such as farmers, transporters, sellers, and border agents</li> <li>2. Train on visual recognition of diseases and how to collect data</li> </ol>	<ol style="list-style-type: none"> <li>1. Raise awareness and educate actors in the cassava sector on viral diseases</li> <li>2. Carry out random tests at borders</li> <li>3. Use varieties resistant to viral disease</li> <li>4. Preventive selection</li> <li>5. Border control</li> </ol>	<ol style="list-style-type: none"> <li>1. Raise awareness and educate actors in the cassava sector on how to recognize disease symptoms</li> <li>2. Disseminate information on how diseases impact production</li> </ol>	<ol style="list-style-type: none"> <li>1. Formally commit the different actors to implementation of the national action plan</li> </ol>

	<p>been detected in Côte d'Ivoire. However, reported in Burkina Faso and Benin. High risk.</p> <p>d. Cassava brown streak disease (CBSD). Not yet present in Côte d'Ivoire. However, as it is migrating from East Africa and causes tuberous roots unfit for any consumption, it is classed as high risk.</p>					
Who	<ul style="list-style-type: none"> <li>- The DPVCQ is responsible for risk analysis and the Government announces the risk level</li> <li>- National research institutions</li> </ul>	<ul style="list-style-type: none"> <li>- DPVCQ</li> <li>- Research institutions</li> </ul>	<ul style="list-style-type: none"> <li>- Producers</li> <li>- Cassava innovation platform stakeholders</li> <li>- Surveillance officers</li> <li>- Ministry of Agriculture phytosanitary agents</li> <li>- Researchers</li> </ul>	<ul style="list-style-type: none"> <li>- Ministry of Agriculture</li> <li>- Research institutions</li> <li>- Surveillance</li> </ul>	<ul style="list-style-type: none"> <li>- Traditional and religious leaders</li> <li>- Local development mutuals</li> <li>- Women and young people's associations</li> <li>- Locally elected representatives</li> <li>- Agricultural NGOs</li> <li>- Farmers' organizations</li> </ul>	<ul style="list-style-type: none"> <li>- Producers</li> <li>- Factories/industry</li> <li>- Seed producers</li> <li>- Farmers' organizations</li> <li>- Transporters</li> <li>- Sellers</li> <li>- Consumers</li> <li>- Research institutions</li> </ul>
How	<ol style="list-style-type: none"> <li>1. Risk is evaluated taking into account the impact on production, the economic and environmental consequences, and the probability of the harmful organism entering, becoming established, and spreading.</li> <li>2. The risk analysis is conducted with the support of researchers. It draws on field data provided primarily by producers, extension agents, and researchers.</li> </ol>	<ol style="list-style-type: none"> <li>1. Design, produce, and distribute training guides and factsheets on recognizing the symptoms of cassava diseases</li> <li>2. Set up regulatory and technical bodies</li> <li>3. Mass communication and sensitization using radio,</li> </ol>	<ol style="list-style-type: none"> <li>1. Use rapid detection kits, including smartphones with an appropriate app</li> <li>2. Map the presence of viruses through surveys across the whole territory</li> <li>3. Regular inspections at borders</li> </ol>	<ol style="list-style-type: none"> <li>6. Workshops, publications in newspapers, presentations on TV, etc.</li> <li>7. Leach plantations to identify pathogens, especially in high-risk areas</li> <li>8. Create a gene bank (stock of resistant varieties)</li> <li>9. Make arrangements for</li> </ol>	<ol style="list-style-type: none"> <li>1. Hold workshops, publish in newspapers, TV programs, etc.</li> <li>2. Design the message for different targets</li> <li>3. Broadcast the message through channels such as local radio, traditional leaders, griots, and local authorities</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw up conventions, memoranda of understanding, and contracts between the different actors to implement the national action plan</li> </ol>

	<p>3. The manual will be based around the following points:</p> <p>a. First steps (identification of harmful organisms)</p> <p>b. Risk assessment</p> <ul style="list-style-type: none"> <li>- Categorization of each harmful organism</li> <li>- Evaluating the probability of the harmful organism entering, becoming established, and spreading</li> <li>- Evaluating economic and environmental consequences</li> </ul> <p>c. Risk management (identification of management options aiming to reduce the risks identified under point 2)</p>	<p>religious communities, etc.</p> <p>4. Researcher-led 'train the trainer' sessions for extension agents, and seminars and refresher training for researchers</p> <p>5. Evaluate laboratories' capacity to tackle viral diseases and produce planting material, then address the gap by providing equipment</p>		control at border crossings	4. Set up committees (village, departmental, regional, national)	
When	- From CGU-MVM setup and ongoing	- Urgent and immediate action: from CGU-MVM setup	- Ongoing	- Take action immediately	- Urgent and immediate action: from CGU-MVM setup	- Take action immediately

## Summary

The risk analysis was defined according to International Standard for Phytosanitary Measures No. 11 (ISPM 11) from the IPPC. Risk levels were classified based on damage to cassava production. The ACMV and EACMV viruses (present in Côte d'Ivoire) have a moderate risk level. The EACMV-UG virus (found in Burkina Faso and Benin) is moderate to high risk. CBSV (identified in Central Africa) presents a very high risk.

The actions to be taken before an outbreak are:

- Develop a risk management plan;

- Ensure ongoing surveillance;
- Raise awareness;
- Provide information;
- Train;
- Formally commit the different actors to implementation of the national action plan, through contractual agreements among others.

## Actions to be taken in case of an outbreak

*Table 5: Actions to be taken in case of an outbreak*

	Detection, identification, and confirmation	Response, containment, quarantine, and elimination	System activation	System operation	Evaluation of response
What	1. Follow the standard information flow from outbreak detection to confirmation, as follows: Producer–surveillance officer–DD–RD–DPVCQ	1. Measures to combat or protect against the harmful threat	1. Introduce measures decreed by the CGU-MVM	1. Collect epidemiological data, data on aggressivity, and threat severity score in the different zones	1. Aspects of the crisis response are evaluated: human resources, equipment, economic and social dimension
Who	<ul style="list-style-type: none"> <li>- Those responsible for early detection are: Producers, surveillance committee</li> <li>- Decisions about the level of the threat will be made following this chain: Ministry of Agriculture (DPVCQ)–Research (SNRA)–Committee of experts</li> <li>- The key bodies alerted are: DD, RD–DPVCQ</li> </ul>	- The DPVCQ is responsible for quarantine, containment, and elimination of threats	<ul style="list-style-type: none"> <li>- The state of preparedness of the surveillance system is examined by the emergency committee</li> <li>- The Ministry of Agriculture is responsible for communicating about the threat</li> </ul>	- Ministry of Agriculture and technical partners (universities and research centers)	- Ministry of Agriculture
How	<ol style="list-style-type: none"> <li>1. The threat is confirmed via a procedure: Alerting procedure (surveillance officer – DD or RD – research (SNRA) – committee of experts)</li> <li>2. At-risk areas are generally detected by growers in their plantations. The observation of symptoms is shared with surveillance officers, who may take the initial approach to the nature of the threat. However, the information is sent to the regional or departmental directorate, which alerts a research organization (or expert committee for unusual cases) to confirm or disprove the diagnosis. When the threat is confirmed, the</li> </ol>	<ol style="list-style-type: none"> <li>1. The mechanisms for containment and quarantine are: Observe, inform the DPVCQ, implement decision made by authorities, isolate, quarantine</li> <li>2. The viral threat is eliminated as follows: Pull up and burn or bury infected plants, off-types, and refuge plants (hosts), leave fallow, source disease-free seeds, source resistant</li> </ol>	<ol style="list-style-type: none"> <li>1. Intensify phytosanitary inspections</li> <li>2. Identify and monitor production sites for planting materials</li> <li>3. Perform thorough checks on these sites to ensure their disease-free status</li> <li>4. Facilitate communication along the chain from detection to activation of the system</li> </ol>	<ol style="list-style-type: none"> <li>1. Mobilize staff</li> <li>2. Produce a ministerial decree</li> <li>3. Deploy resources</li> <li>4. Make an emergency fund available, equip the emergency committee</li> <li>5. Collect and record data from sampling, questionnaires, and mapping</li> <li>6. Activate the communications mechanism which involves using the traditional system such</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure decisions made in response to an alert are effective: The information gets through at national level, and areas of outbreak are contained</li> <li>2. Gap assessment</li> </ol>



	DPVCQ is responsible for risk analysis and the Government announces the risk level. 3. People are informed of the threat via: telephone, social media, face-to-face visits, written letters	varieties, source clean plants		as griots, radio broadcasts, press channels, social media, surveillance committee, workshops, and awareness raising	
When	- As soon as signs of outbreak appear	- In the quarantine period - During the incubation period for the pathogen	- Automatically	- Automatically	- During and after the outbreak

## Summary

If an outbreak appears, the hierarchical reporting chain is as follows:

- Grower – surveillance officer – DD / RD – DPVCQ.

The research organization will proceed with confirmation. The DPVCQ activates the response system in collaboration with researchers (containment, quarantine, elimination, etc.). If needed, experts can be contacted. The Ministry of Agriculture is responsible for communicating about the threat with the government's approval.

## Measures to be taken after an outbreak

After the outbreak, some measures such as awareness raising and plant health surveillance will continue.

The actions to be taken after an outbreak are:

- Ensure ongoing surveillance;
- Raise awareness;
- Provide information;
- Train;
- Obtain formal commitment among the different actors to continue to implement the action plan as before the outbreak. In particular, phytosanitary measures must continue to be strictly observed.

## Phytosanitary measures

### Laws and regulations on biosecurity

Some laws and regulations are already in force:

1. WAEMU and ECOWAS regulations on seeds;
2. Law No. 64-490 of 21 December 1964 on plant protection;
3. Decree No. 63-457 of 7 November 1963 setting the conditions for introducing and exporting plants and other materials likely to harbor organisms that are dangerous for crops;
4. Order No. 2007 of 10 December 1963 setting out the details of application of Decree No. 63-457 of 7 November 1963;
5. Decree No. 89-02 of 4 January 1989 on the authorization, manufacture, sales, and use of pesticides;
6. Decree No. 93-313 of 11 March 1993 implementing Law No. 91-999 of 27 December 1991 on competition as concerns the conditions of entry into Côte d'Ivoire of foreign goods from any origin and any provenance, as well as the conditions for export and reuse of goods intended for foreign countries;
7. Law No. 96-766 of 3 October 1996 embodying the Environmental Code;
8. Decree No. 96-894 of 8 November 1996 determining the rules and procedures applicable to studies concerning the environmental impact of development projects;
9. Joint Ministerial Decision No. 509/MINAGRI/MEMIS of 11 November 2014 organizing the control of pesticides and the sanitary, phytosanitary, and quality inspection and control of plants, plant products, agricultural products, and any other material likely to harbor organisms that are harmful to crops, human health, and animals at entrance and exit points to the national territory.

**Alerting mechanism:** The agent alerts the Ministry of Agriculture DD/RD, and the DD/RD alerts the DPVCQ and the research organization (for identification).

## Summary

There are regional community regulations (ECOWAS and WAEMU), a law on plant protection, and regulatory texts governing phytosanitary measures in Côte d'Ivoire. However, these are not specific to cassava.

## Seed systems

### Mechanism for certifying people or organizations who market cassava seeds

- Obtain approval from the Ministry of Agriculture (DPVSA)
- Propagation sites inspected and approved
- Cuttings certified (DPVSA)

### Better practice for the treatment of cassava cuttings

- Sanitize cuttings (research organizations)
- Use resistant varieties and disease-free cuttings
- Implement a slash-and-burn plan
- Raise awareness among growers

### Prescribed mode of transport for cassava cuttings

Make bundles of cuttings. Label each batch with the variety or cultivar and its origin to ensure traceability.

## Summary

The seed production sector for vegetatively propagated plants in Côte d'Ivoire is becoming organized. There are not yet any formal producers of cassava cuttings, although some associations describe themselves as such. To be beneficial, the activity of producing and propagating cassava cuttings must be subject to prior authorization issued by the Ministry of Agriculture. Similarly, the seeds (cassava cuttings) must be certified to ensure quality from a plant health point of view.

During an outbreak, pulling up plants and replacing them with disease-free or resistant varieties is one of the best phytosanitary methods for improving productivity. The use of bio-pesticides and biological control, as well as new cultivation practices, should also be considered as phytosanitary measures to reduce pressure from the virus.

## Vector control

**Treatment of whitefly:** Cassava crops in farmers' fields are not treated for whitefly, and non-chemical methods are not used to tackle whitefly. Whitefly is addressed by following the crop protocol and removing host plants.

**Management of infected plants:** There is no mechanism for managing infected cassava plants, but growers often replace infected fields with tolerant cuttings.

**Distribution of resistant varieties:** Research organizations distribute tolerant and/or resistant varieties to growers with respect to the existing viral diseases. Examples of varieties include BOCOU3, TMS4(2)1425, IM93, and TMS30572.

### Communication & awareness raising

**Community engagement:** Growers, the administrative authorities, traditional and religious leaders, extension agents, and researchers should be involved in the fight against viral threats.

**Means of communication:** Local/grassroots communication, audiovisual, written press, social media, information meetings, and leaflets.

**Awareness raising:** This will take place through roadshows, grower training, seminars, and training workshops.

**Frequency of engagement:** Every three months on local radio, followed by awareness-raising activities, roadshows, training for growers, seminars, and workshops. These activities will be planned yearly until it becomes part of everyday life for the populations.

### Summary

Community engagement can be obtained by involving opinion leaders (local authorities and religious leaders), all stakeholders involved in the cassava sector, agricultural technicians, and civil society actors. Community awareness raising will cover strategies to combat viral diseases. Training will cover the recognition of cassava viral disease symptoms and the application of phytosanitary standards.

## V. OPERATIONAL STRATEGY

### Strategy implementation plan

#### Roadmap

The roadmap incorporates the five strategic objectives defined for implementing the action plan.

1. Obtain the government's commitment to supporting sustainable cassava production
2. Adopt a national action plan on cassava viral diseases
3. Strengthen the capacity of the Côte d'Ivoire agricultural system to tackle cassava viral diseases
4. Develop operational mechanisms for alerting and responding to a plant health crisis
5. Set up an integrated national phytosanitary system

Table 6: Schedule for CGU-MVM action plan

Strategic objective	Results	Activities	Responsibility	2018	2019			2020			2021			2022			2023		
				Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
Strategic objective 1: Set up a coordination unit for activities relating to the cassava viral disease action plan	Result 1.1: The government commits to supporting sustainable cassava production	Activity 1: Explain the challenges posed by viral disease threats and the opportunities offered by WAVE's solutions during a meeting with the Minister for Agriculture	WAVE	X															
		Activity 2: Get the action plan on cassava viral diseases approved	WAVE, DPVCQ		X														
		Activity 3: Obtain a letter of commitment to implementing the national action plan on cassava viral diseases, signed by the Minister for Agriculture	DPVCQ, WAVE	X															
		Activity 4: Obtain a memorandum to the Council of Ministers to get the Government's support	DPVCQ, WAVE		X														
		Activity 5: Obtain a ministerial decree to set up the Emergency Management Committee for Cassava Viral Diseases	WAVE, DPVCQ		X														
	Result 1.2: The emergency operations center (CGU-MVM) is operational	Activity 1: Institutionalize the CGU-MVM in legal terms	DPVCQ, WAVE		X														
		Activity 2: Draw up a person specification for CGU-MVM members	WAVE, DPVCQ			X													
		Activity 3: Develop a procedural manual describing mechanisms for collaboration between stakeholders	WAVE, DPVCQ			X	X												

		Activity 4: Appoint or recruit key human resources for the CGU-MVM	DPVCQ				X	X											
		Activity 5: Set up and operationalize the CGU-MVM (sites, equipment, and operations)	Ministry of Agriculture				X	X											
	Result 1.3: Activities for managing cassava viral diseases are coordinated	Activity 1: Draw up a list of experts involved in managing cassava viral diseases	DPVCQ			X	X												
		Activity 2: Draw up a list of technical partners involved in activities to combat viral diseases	DPVCQ			X	X												
		Activity 3: Organize monitoring meetings on the management of cassava viral diseases	WAVE, DPVCQ			X													
		Activity 4: Harmonize and plan the activities of the various stakeholders involved in tackling cassava viral diseases	DPVCQ				X	X											
		Activity 5: Encourage and increase awareness among decision makers and traditional leaders	WAVE, DPVCQ			X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 6: Hold regular committee meetings	DPVCQ			X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 7: Communicate about the proposed action plan to mitigate cassava viral diseases	WAVE, Ministry of Agriculture			X	X	X	X	X									
<b>Strategic objective 2: Strengthen the capacity of the Côte d'Ivoire</b>	Result 2.1: A status report is produced covering programs and laboratories, structures for		WAVE, DPVCQ					X	X										

agricultural system to tackle cassava viral diseases	seed production, stakeholders' knowledge (perceptions) of diseases, and the material resources needed																		
	Result 2.2: Stakeholders' capacities are strengthened following recommendations from the study	Activity 1: Build laboratory capacities for <i>in vitro</i> culture	WAVE, DPVCQ								X	X							
		Activity 2: Increase laboratories' detection capacities	WAVE, DPVCQ								X	X							
		Activity 3: Build capacity among phytosanitary inspectors	DPVCQ										X	X					
		Activity 4: Build growers' and seed producers' capacity to recognize cassava diseases	DPVCQ								X		X				X		
		Activity 5: Build capacity among surveillance officers and extension agents	DPVCQ									X				X			X
		Activity 6: Build committee members' capacity to manage outbreaks, emergencies, and exceptional phytosanitary security situations	DPVCQ, WAVE								X			X				X	
	Result 2.3: A critical mass of researchers and technicians is trained in the management	Activity 1: Evaluate and identify needs for training courses and skills training	WAVE, Consultant					X											
		Activity 2: Organize training courses and refresher training	WAVE, DPVCQ									X				X			X
		Activity 3: Contribute to master's and PhD degrees in the field of cassava diseases	WAVE, DPVCQ,								X	X	X	X	X	X	X	X	

	of cassava viral diseases		University, SNRA																
	Result 2.4: A communications strategy is developed on the impact of cassava viral diseases	Activity 1: Form a communications team for viral diseases	Ministry of Agriculture, WAVE				X	X											
		Activity 2: Design and produce communications tools (audio, video, guide, leaflets, website, smartphone app, social media) in French and local languages	ANADER, WAVE					X	X	X									
		Activity 3: Carry out mass awareness-raising campaigns (forum, appeal)	CGU-MVM								X	X	X	X	X	X	X	X	X
		Activity 4: Run information, education, and communication (IEC) campaigns among growers on phytosanitary standards, seed movement, and seed certification	CGU-MVM								X	X	X	X	X	X	X	X	X
		Activity 5: Prepare growers to adopt adaptation strategies to compensate for the negative effects of cassava viral diseases	CGU-MVM								X	X	X	X	X	X	X	X	X
<b>Strategic objective 3: Set up an integrated national phytosanitary system</b>	Result 3.1: A map of cassava viral disease locations is produced	Activity 1: Map cassava production zones	WAVE					X			X			X			X		
		Activity 2: Determine geographic distribution of viruses and vectors	WAVE				X			X			X			X			X
	Result 3.2: Propagation of cassava cuttings is regulated	Activity 1: Register cuttings producers and issue them with authorization	DPVSA		X			X			X			X			X		
		Activity 2: Identify production sites for planting material that are near production zones	DPVSA		X			X			X			X			X		



		Activity 3: Monitor propagation plots	DPVSA, WAVE			X			X			X			X			X	
		Activity 4: Certify the quality of planting material	DPVSA, WAVE				X			X			X			X			X
	Result 3.3: The circulation of planting material is regulated		Ministry of Agriculture		X	X													
	Result 3.4: There is guaranteed production of disease-free planting material	Activity 1: Maintain and store cassava germplasm	WAVE, SNRA		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 2: Control germplasm that enters the country	WAVE, SNRA		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 3: Sanitize elite planting material or the planting material preferred by farmers	WAVE, SNRA			X		X		X		X		X		X		X	
		Activity 4: Support the development of varieties that are resistant to emerging cassava viral diseases	DPVCQ		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Result 3.5: Good agricultural practice for managing cassava viral diseases becomes widespread	Activity 1: Set up a plant health information network	CGU-MVM						X	X									
		Activity 2: Raise awareness of phytosanitary standards	CGU-MVM							X			X			X			X
		Activity 3: Control vectors using biological control	SNRA		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Strategic objective 4:	Result 4.1: The early warning and	Activity 1: Coordinate initiatives and activities that relate to disease management and cassava	Ministry of Agriculture	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Develop operational mechanisms for alerting and responding to a plant health crisis	response system is activated through application of the instructions given by the CGU-MVM	production at departmental and national level																		
		Activity 2: Strengthen the communications system	CGU-MVM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 3: Seek additional funding	Ministry of Agriculture, CGU-MVM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 4: Deploy human and material resources in line with the action plan	CGU-MVM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 5: Analyze the effectiveness of decisions made in response to the alert	CGU-MVM	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Result 4.2: Epidemiological data are collected and analyzed	Activity 1: Acquire additional rolling stock	WAVE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 2: Intensify surveying activities	WAVE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Result 4.3: The threat is detected and confirmed by researchers	Activity 1: Acquire additional consumables	WAVE	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 2: Recruit a casual workforce	DPVCQ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Result 4.4: The intervention to mitigate the threat is effective	Activity 1: Intensify phytosanitary inspections	DPVCQ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 1: Identify the origin of infected seeds and monitor planting material production sites	DPVSA	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 2: Contain areas of viral disease outbreak	DPVCQ	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
		Activity 3: Implement disease management measures	ANADER	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

## Resource mobilization plan

The total budget for setting up and operationalizing the EOC is 10,297,880 USD for a duration of five years. This budget breaks down as follows:

*Table 7: Budget over five years*

Year 1	440,000 USD
Year 2	2,334,000 USD
Year 3	3,082,660 USD
Year 4	2,261,080 USD
Year 5	2,180,120 USD

**The order of priority for the different funding needs is as follows:**

- Capital expenditure
- Operating expenses
- Contingency budget

**The different sources of funding identified are:**

- Local authorities
- Regional councils
- Cassava industry groups
- Foundations: BMGF, Rockefeller Foundation, Fondation Orange, etc.
- Research and development projects: FCIAD, FONARI, PASRES, WATP
- Bilateral cooperation: USAID, UK Aid, IDRC (Canada), embassies
- Multilateral partners: ECOWAS, WAEMU, the EU, the AU, FAO, UNICEF
- Technical and financial partners such as the AfDB, WB, IMF, CORAF, and FARA

**Local government could contribute as follows:**

- Subsidy and special budget: Allocation of a budget item to CGU-MVM from each ministry involved
- Activation of bilateral partners
- Organization of the cassava sector so as to support CGU-MVM funding in the long term

## Implementation risk management

**Main threats to implementing this action plan**

- Lack of financial resources
- Cumbersome disbursement mechanisms
- Force majeure (political and social unrest, natural disasters, catastrophes)

- Red tape
- Lack of political commitment
- Political instability
- Non-adoption of new varieties by growers

**The following measures and mechanisms mitigate against the threats to implementation:**

- Research the necessary resources with the Government and technical and financial partners
- Simplify the mechanisms for disbursing funds for this project
- Raise awareness among growers
- Campaign for the Government to set aside a budget
- Compensatory measures

## Monitoring and evaluation plan

The M&E plan is set out in the table below.

Table 8: Monitoring and evaluation plan

Intervention logic	Expected results	Activities	Monitoring indicators	Monitoring frequency	Responsible for execution and monitoring	Verification sources	Assumptions	Evaluation frequency	Responsible for evaluation
Specific objective 1: Set up a coordination unit for activities relating to the cassava viral disease action plan	R1: The government commits to supporting sustainable cassava production	A1. Explain the challenges posed by viral disease threats and the opportunities offered by WAVE's solutions during a meeting with the Minister	Document requesting or agreeing to a meeting	Yearly	WAVE	Meeting report	Good collaboration between WAVE and ministries	Start of project	Independent experts
		A2. Get the action plan on cassava viral diseases approved	Number of validation meetings	Yearly	DPVCQ, WAVE	Meeting minutes, plan document	Good collaboration between WAVE and ministries	Start of project	Independent experts
		A3. Obtain a letter of commitment to implementing the national action plan on cassava viral diseases, signed by the Minister for Agriculture	Letter of commitment	One-off	DPVCQ, WAVE	Copy of signed letter of commitment available	Good collaboration between WAVE and ministries	Start of project	Independent experts
		A4. Obtain a memorandum to the Council of Ministers to get the Government's support	Council of Ministers memorandum written	One-off	DPVCQ	Council of Ministers report published in journal	Significant involvement from ministerial departments involved	Start of project	Internal experts
		A5. Obtain a ministerial decree to set up the Emergency Management Committee for Cassava Viral Diseases	A draft decree letter is written and submitted to the minister	Once	DPVCQ	The ministerial decree is signed	The Directorate for Plant Protection is educated	Start of project	External experts

	R2: The emergency operations center (CGU-MVM) is operational	<b>A1.</b> Institutionalize the CGU-MVM in legal terms	A draft decree letter is written and submitted to the minister	Once	WAVE and DPVCQ	A document with legal value exists	Good collaboration between WAVE and ministries	Start of project	Independent experts
		<b>A2.</b> Draw up a person specification for CGU-MVM members	The person specification is drawn up	Once	WAVE and DPVCQ	The person specification is available	Good collaboration between WAVE and ministries	Start of project	Independent experts
		<b>A3.</b> Develop a procedural manual describing mechanisms for collaboration between stakeholders	The procedural manual is produced	Once	WAVE and DPVCQ	The procedural manual is available	Good collaboration between WAVE and ministries	Start of project	Independent experts
		<b>A4.</b> Appoint or recruit key human resources for the CGU-MVM	Calls for candidates are published	As needed and per project	DPVCQ	Letter of appointment available	Favorable economic and social environment	Start of project	Independent experts
		<b>A5.</b> Set up and operationalize the CGU-MVM (sites, equipment, and operations)	The CGU-MVM is set up	One-off	Ministry of Agriculture	Existence of premises for CGU-MVM	Favorable economic and social environment	Start of project	Independent experts
	R3: Activities for managing cassava viral diseases are coordinated	<b>A1:</b> Draw up a list of experts involved in managing cassava viral diseases	List of experts	One-off	DPVCQ	Consultant's report, list of experts available	Significant involvement from ministerial departments involved	Start of project	Internal experts

		<b>A2:</b> Draw up a list of technical partners involved in activities to combat viral diseases	List of technical partners	One-off	DPVCQ	Consultant's report, technical report available	Significant involvement from ministerial departments involved	Start of project	Internal experts
		<b>A3.</b> Organize monitoring meetings on the management of cassava viral diseases	Number of meetings	Per project	DPVCQ, WAVE	Meeting report	Favorable economic and social environment	Start of project	Independent experts
		<b>A4.</b> Harmonize and plan the activities of the various stakeholders involved in tackling cassava viral diseases	Number of harmonization and planning meetings	Per project	DPVCQ	Meeting report	Favorable economic and social environment	Start of project	Independent experts
		<b>A5.</b> Encourage and increase awareness among decision makers and traditional leaders	Number of awareness-raising meetings	As needed	DPVCQ, WAVE	Record of meetings	Favorable economic and social environment	Start of project	Independent experts
	Specific objective 2:	<b>A6.</b> Hold regular committee meetings	Number of meetings	Every 3 months	DPVCQ	Record of meeting	Favorable economic and social environment	Start of project	Independent experts
		<b>A7.</b> Communicate about the proposed action plan to mitigate cassava viral diseases	Number of materials or events	As needed	WAVE Ministry of Agriculture	Communication materials	Favorable economic and social environment	Start of project	Independent experts



Strengthen the capacity of the Côte d'Ivoire agricultural system to tackle cassava viral diseases	R1: A status report is produced covering programs and laboratories, structures for seed production, stakeholders' knowledge (perceptions) of diseases, and the material resources needed	NA	A survey	WAVE + DPVCQ	Survey reports	Good collaboration between WAVE and ministries	Start of project	Independent experts	
	R2: Stakeholders' capacities are strengthened following recommendations from the study	A1. Build laboratory capacities for <i>in vitro</i> culture	Number of items of equipment acquired or staff trained	As needed	WAVE, DPVCQ	Delivery note and certificates of participation	Favorable economic and social environment	Start of project	Independent experts
		A2. Increase laboratories' detection capacities	Number of items of equipment acquired or staff trained	As needed	WAVE, DPVCQ	Delivery note and certificates of participation	Favorable economic and social environment	Start of project	Independent experts
		A3. Build capacity among phytosanitary inspectors	Number of training sessions, number of staff trained	As needed	DPVCQ	Training certificates	Favorable economic and social environment	Start of project	Independent experts
		A4. Build growers' and seed producers' capacity to recognize cassava diseases	Number of training sessions, number of staff trained	Throughout the project	DPVCQ	Training certificates	Involvement and support of growers and seed producers	Per project	Independent experts
		A5. Build capacity among surveillance officers and extension agents	Number of training workshops, number of staff trained	Throughout the project	DPVCQ	Workshop report	Involvement and support of stakeholders	Start of project	Independent experts
		A6. Build committee members' capacity to manage outbreaks, emergencies, and exceptional phytosanitary security situations	Number of seminars	Yearly	DPVCQ, WAVE	Report of seminars	Favorable economic and social environment	Start of project	Independent experts

	R3: A critical mass of researchers and technicians is trained in the management of cassava viral diseases	A1. Evaluate and identify needs for training courses and skills training	Evaluation sheets	During the project	WAVE, Consultant	Consultant's report	Favorable economic and social environment	Start of project	Independent experts
		A2. Organize training courses and refresher training	Number of courses	During the project	DPVCQ WAVE	Course report	Funding not available	Per project	Independent experts
		A3. Contribute to master's and PhD degrees in the field of cassava diseases	Number of students	During the project	DPVCQ WAVE University Research center	Course report	Funding not available	Per project	Independent experts
	R4: A communications strategy is developed on the impact of cassava viral diseases	A1. Form a communications team for viral diseases	Instrument of appointment	During the project	Ministry of Agriculture WAVE	Instrument of appointment	Availability of qualified staff	Per project	Independent experts
		A2. Design and produce communications tools (audio, video, guide, leaflets, website, smartphone app, social media) in French and local languages	Number of tools	During the project	Ministry of Agriculture, WAVE	Tools available: audio, video, guide, leaflets, website, smartphone app, social media	Funding not available	Per project	Independent experts
		A3. Carry out mass awareness-raising campaigns (forum, appeal)	Number of campaigns	During the project	CGU-MVM	Forum, appeal, open days	Favorable economic and social environment	Per project	Independent experts
		A4. Run information, education, and communication (IEC) campaigns among growers on phytosanitary standards, seed movement, and seed certification	Number of IEC campaigns	During the project	CGU-MVM	Workshop report Training documents	Favorable economic and social environment	Per project	Independent experts

		A5. Prepare growers to adopt adaptation strategies to compensate for the negative effects of cassava viral diseases	Number of training workshops	During the project	CGU-MVM	Workshop report Training documents	Favorable economic and social environment	Per project	Independent experts
Specific objective 3: Set up an integrated national phytosanitary system	R1: A map of cassava viral disease locations is produced	A1. Map cassava production zones	Number of surveys	Per project	WAVE	Density maps available	Favorable economic and social environment	Throughout the project	Independent experts
		A2. Determine geographic distribution of viruses and vectors	Number of surveys	Per project	WAVE	Health maps available	Favorable economic and social environment	Throughout the project	Independent experts
	R2: Propagation of cassava cuttings is regulated	A1. Register cuttings producers and issue them with authorization	Each category of stakeholder has received at least one training session on cassava diseases in 10 regions	Yearly	DPVSA	Ministry meeting report	Significant involvement by the Ministry of Agriculture	–Mid-term evaluation –Impact evaluation	Internal experts
		A2. Identify propagation sites for planting material that are near production zones	Number of propagation sites	Per project	DPVSA	Site visit	Favorable economic and social environment	–Mid-term evaluation –Impact evaluation	Independent experts
		A3. Monitor propagation plots	Number of surveillance rounds	Once every 6 months	DPVSA, WAVE	Site visit report	Favorable economic and social environment	–Mid-term evaluation –Impact evaluation	Independent experts
		A4. Certify the quality of planting materials	Number of certificates issued	Throughout the project	DPVSA, WAVE	Certificates issued	Significant involvement from Ministry of Agriculture and growers	Mid-term evaluation	Independent experts

	R4: The circulation of planting material is regulated	NA	Number of directives	Yearly	Ministry of Agriculture	Decrees and regulations	Significant involvement from Ministry of Agriculture and growers	–Mid-term evaluation –Impact evaluation	Independent experts
	R5: There is guaranteed production of disease-free planting material	A1. Maintain and store cassava germplasm	Number of cassava accessions	Yearly	WAVE SNRA	Activity reports	Protected storage sites	Mid-term evaluation	Independent experts
		A2. Control germplasm entering the country	Number of cassava accessions entering	Yearly	WAVE SNRA	Activity reports	Insufficient equipment and training for inspectors	Mid-term evaluation	Independent experts
		A3. Sanitize elite planting material or the planting material preferred by farmers	Number of clean cassava varieties	Yearly	WAVE SNRA	Activity reports	Good working conditions	Mid-term evaluation	Independent experts
		A4. Support the development of varieties that are resistant to emerging cassava viral diseases	Number of research actions for creating varieties	Yearly	SNRA	Activity report	Funding available	Mid-term evaluation	Independent experts
	R6: Good agricultural practice for managing cassava viral diseases becomes widespread	A1. Set up a plant health information network	Number of meetings	Per project	CGU-MVM	Activity report	Significant involvement from stakeholders	Mid-term evaluation	Independent experts
		A2. Raise awareness of phytosanitary standards	Number of campaigns	Yearly	CGU-MVM	Report of seminars	Significant involvement from stakeholders	Mid-term evaluation	Independent experts

		<b>A3.</b> Control vectors using biological control	Alternative solutions to chemical control	Per project	SNRA	Report of seminars	Funding available	Mid-term evaluation	Independent experts
<b>Specific objective 4: Develop operational mechanisms for alerting and responding to a plant health crisis</b>	R1: The early warning and response system is activated through application of the instructions given by the CGU-MVM	<b>A1.</b> Coordinate initiatives and activities that relate to disease management and cassava production at departmental and national level	At least one simulation per year	Permanent	Ministry of Agriculture	Ministry of Agriculture activity reports	Significant involvement from the Ministry of Agriculture	Mid-term evaluation	Independent experts
		<b>A2.</b> Strengthen the communications system	Number of items of equipment acquired or staff trained	Yearly	CGU-MVM	Delivery notes and certificates of participation	Significant involvement from system actors	Mid-term evaluation	Internal experts
		<b>A3.</b> Seek additional funding	—At least one MoU is signed with a funder —A line item is allocated in the ministry budget	Per project Yearly	Ministry of Agriculture CGU-MVM	Ministry budget MoU or contract	Significant involvement by the Ministry of Agriculture	Per project	Independent experts
		<b>A4.</b> Deploy human and material resources in line with the action plan	Actors deployed	When threat reported	CGU-MVM	Service orders	Favorable economic and social environment	When threat reported	Independent experts
		<b>A5.</b> Analyze the effectiveness of decisions made in response to the alert	Number of M&E missions	During outbreak	CGU-MVM	Monitoring report	Strict application of instructions	Permanent	Internal experts
	R2: Epidemiological data are collected and analyzed	<b>A1.</b> Acquire additional rolling stock	Number and types of material resources acquired	During outbreak	CGU-MVM	Delivery note	Availability of funds	Permanent	Internal experts

		<b>A2.</b> Intensify surveying activities	Number of missions	During outbreak	CGU-MVM	Mission reports	Favorable economic and social environment	Permanent	Internal experts
	R3: The threat is detected and confirmed by researchers	<b>A1.</b> Acquire additional consumables	Quantity and nature of consumables	As needed	WAVE, SNRA	Delivery note	Favorable economic and social environment	Permanent	Independent experts
		<b>A2.</b> Recruit a casual workforce	Call for candidates	As needed	CGU-MVM	Service provider contracts	Favorable economic and social environment	Permanent	Independent experts
	R4: The intervention to mitigate the threat is effective	<b>A1.</b> Intensify phytosanitary inspections	Number of inspection missions	In the event of an outbreak	CGU-MVM	Mission reports	Favorable economic and social environment	Permanent	Independent experts
		<b>A2.</b> Identify the origin of infected seeds and monitor planting material production sites	Traceability investigation	In the event of an outbreak	CGU-MVM	Traceability report	Favorable economic and social environment	Permanent	Independent experts
		<b>A3.</b> Contain areas of viral disease outbreak	Isolation and containment measures	In the event of an outbreak	DPVCQ	Activity report	Favorable economic and social environment	—Permanent —Impact evaluation	Independent experts
		<b>A4.</b> Implement disease management measures	Measures to adopt management methods	In the event of an outbreak	CGU-MVM	M&E report	Significant involvement from stakeholders	—Evaluation during outbreak —Impact evaluation	Independent experts

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