



ACTION PLAN TO MITIGATE THE VIRAL DISEASE THREATS ON CASSAVA IN CAMEROON

December 2018

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LIST OF ABBREVIATIONS AND ACRONYMES

ACMV:	African Cassava Mosaic Virus
AEZ:	Agro ecological zone
AGRA:	Alliance for Green Revolution in Africa
BMGF:	Bill & Melinda Gates Foundation
C2D:	Debt Reduction and Development Contract
CAD:	Cassava Anthracnose Disease
CBSV:	Cassava Brown Streak Virus
CGM:	Cassava green mites
CMD:	Cassava Mosaic Disease
CMV:	Cassava Mosaic Virus
CNDT:	National Centre for the Development of Technologies
CPI:	Conseil Phytosanitaire Interafricain
EACMCV:	East African Cassava Mosaic Cameroon Virus
EACMV:	East African Cassava Mosaic Virus
EACMV-UG:	Ugandan variant of the East African Cassava Mosaic Virus
EOC:	EMERGENCY OPERATIONS CENTER
FAO:	Food and Agricultural Organization
GP-DERUDEP:	The Grass field Participatory and Development project
HIPC:	Heavily Indebted Poor Country Initiative
IFAD:	International Fund for Agricultural Development
IITA:	International Institute of Tropical Agriculture
IRAD:	Institute of Agricultural Research for Development
LDC (ADER):	Agro-dealers Cooperatives
MINADER:	Ministry of Agriculture and Rural Development
MINCOMMERCE:	Ministry of Trade
MINPMEESA:	Ministry of Small and Medium Enterprises
MINRESI:	Ministry of Scientific Research and Innovation
NGO:	Non-governmental organization
PRASAC:	Regional Research Center Applied to the Development of Agricultural systems in Central Africa
PIDMA:	Agricultural Investment and Market development project
PNDRT:	National Program for the Development of Roots and Tubers.
SOWEDA:	Southwest Development Authority
USAID:	United States Agency for International Development
WAVE:	West African Virus Epidemiology for Food Security

FOREWORD

The creation of the Emergency Operations Center (EOC) forms part of a collective effort to respond to the need to put preparation at the center of an enlarged strategy in the management of crop production and nutrition emergencies. Indeed, the prevalence in Tropical Africa of several species/variants of disease-causing viruses affecting the cassava plant, notably Cassava Brown Streak Virus (CBSV) clearly demonstrates the weakness of our plant quarantine systems in the face of an outbreak. It is in this wise that more efforts are being made to reinforce the prevention, detection, and coordination in our crisis management system in order to better control the viral threats and their effects on cassava production, human nutrition and food sufficiency.

However, the development and diffusion of resistant/tolerant cassava varieties against CMD in Cameroon and the existence of numerous initiatives to reinforce or set up emergency coordination structures at the national, sub-regional and continental levels gives us much hope. Furthermore, the involvement of several national, regional and international organizations in separate or coordinated drives for the surveillance and control of the spread of plant diseases deserves to be highlighted.

Cameroon is part of this collective and pan-African effort.

The EOC shall coordinate detection of viral threats and response activities through strong leadership and a shared vision of all operations. I want to highlight the four principles that have guided the development of this five-year strategic plan of the EOC:

- Cooperation and partnership: The EOC is part of a complementary approach to strengthen the Cameroonian food and nutrition management system. It will define and coordinate mechanisms of preparation and response of all stakeholders, draw lessons from preparedness and response actions and in partnership with sister structures, will improve the effectiveness of the system;
- Capacity development: the EOC will identify the capacity building and infrastructure needs of the entire cassava production and management system;
- Integration of the EOC into international efforts, particularly regarding attainment of the millennium development goals, Cameroon's growth and employment strategy as well as other national, regional and continental initiatives. The aim will be to stop the progression of the CBSV from East Africa to Central and West Africa;
- Creation of an agile, autonomous and visionary institution with access to new resources, research results and equipped with appropriate techniques and technology: The EOC will be at the service of the entire Cameroon crop production system.

MINISTER OF SCIENTIFIC RESEARCH AND INNOVATION

EXECUTIVE SUMMARY

International travel and trade occur at higher levels than ever before and, as people and commodities move around the world, organisms that present risks to plants travel with them. Viral diseases introductions and outbreaks can cause huge losses to governments, producers and consumers on a yearly basis. Once a disease establishes in a new area, its eradication is often impossible, and the control takes up a significant percentage of the input cost to produce food. The early detection of cassava viral diseases as well as a rapid response are therefore critical steps towards limiting their economic, social, and environmental impacts.

This document provides concrete action plans (either pre-emptively or reactively) to mitigate the viral diseases threats on cassava in Cameroon and in West and Central Africa in general and provide technical advice during an incursion. This guideline is built around actions to be taken before and during the disease outbreak. It focuses more on the specific responsibilities of experts on developing incursion response strategies, and development of control (mitigation and eradication) strategies based on the various aspects of the disease epidemiology.

The document has particular relevance for local, national and international government and non-government agencies, scientists, and cassava industry professionals when response actions are needed; and to protect and maintain production and business continuity in unaffected areas during a plant disease emergency.

The document is comprised into five sections:

- Section 1** deals with the context wherein the current national situation on cassava viral threats is presented as well as their risk assessment, the current crisis management process and the gaps acknowledged.
- Section 2** designs the vision and the strategic objectives of the national response plan.
- Section 3** contains the structures of the Emergency Operations Center (EOC) with reference to the institutional anchoring, the governance, the various resources to be used as well as the partnership.
- Section 4** considers the emergency response plan emphasizing on the actions to be taken before and during the disease outbreak.
- Section 5** presents the operational strategy focusing on the implementation, monitoring and evaluation plan.

The actions designed should be used in planning response to incursion of viral diseases threats on cassava for which no pre-emptive contingency plan exist, or in the development of specific incursion management plans (contingency plans) for high risk threats identified in the process of cassava cultivation.

Emergencies brought about by the outbreak of cassava viral diseases may occur anytime without warning. Preparing before an emergency incidence occurs plays a vital role in ensuring that stakeholders have the necessary tools and know how to respond to such an emergency. The information in this document serves as an important guide to all stakeholders in the cassava value chain in making the crop competitive and contributing to the national GDP of the country and region.

I. CONTEXT

I.1. Current national situation on Cassava Viral Threats

I.1.1. Economic and social importance of cassava in the country

Cassava (*Manihot esculenta* Crantz) is one of the main crops cultivated in 3 out of the 5 agro-ecological zones in Cameroon. Contributing 0.2% of world production, Cameroon is currently ranked 12th. In 2017, 374,655 hectares were harvested, with an average yield of 14.68 t/ha (FAOSTAT, 2017). This gives an annual production of about 5.5 million tons amounting to 275 billion FCFA. Cassava is an outstanding staple food crop that contributes the most to per capita food consumption (kg/capita/year) in Cameroon (Woin & Okolle, 2015). It is ranked second after plantain in terms of gross production value (FAOSTAT, 2018). In addition, there has been a steep increase in production from 1.9 million tons in 2001 to 5.5 million tons in 2016 (FAOSTAT, 2018). It has been defined as a crop for women who dominate (68.75% in processing and marketing) most of the value chain (Njukwe, 2014), which plays an important role in food security in Cameroon. The crop occupies about 20% of cultivated land and around 46% of national food crop production. Cassava cultivation offers a potential of 582,744 job opportunities with market value of 43% for roots and tuber crops and 26% for processed products (fufu, gari, waterfufu, etc.) and 17% for fresh roots (MINADER, 2013).

The main dietary source of carbohydrate for 7-8 million Cameroonians consists of food derived from Cassava. The starchy roots are consumed raw, boiled or processed into more than 40 sub-products while the leaf which is rich in protein and micronutrients is eaten as a vegetable (Gnonlonfin *et al.*, 2011; Famurewa *et al.*, 2013; Kolo *et al.*, 2014; Mouafor *et al.*, 2016). The cassava subsector has been identified as one that ensures food security and increases farmers' income in Cameroon (Rural Sector Development Strategy Paper, 2002).

Cassava viral threats impact negatively on food security and income for millions of Cameroonians who depend on cassava and/or cassava products for food and business. Generally, Cassava Mosaic Disease (CMD) and Cassava Brown Streak Disease (CBSD) are the two most important constraints currently affecting cassava production (Legg *et al.*, 2014; Casinga *et al.*, 2018). In Cameroon, the contribution of cassava to food security is threatened by the presence of CMD (Akinbade *et al.*, 2010). Of the 9 species of Cassava Mosaic Virus (CMV) present in Africa, 4 have been identified in Cameroon (Akinbade *et al.*, 2010). Despite the efforts made by the government and international organizations to combat CMD, this disease is prevalent everywhere that cassava is cultivated, causing yield losses of 20-90%. Early infections can induce 77.5-97.3% of yield losses whereas 44.9-80% have been recorded for cassava plants infected during 13-24 weeks after planting. CBSD, though not yet identified in Cameroon, represents a serious threat due to Cameroon's proximity to the Democratic Republic of Congo where the virus is already present (Casinga *et al.*, 2018) and has the potential of causing severe damage to cassava production with losses of up to 100%.

I.1.2. Summary of current situation on the threats to cassava and current mitigation actions

Cassava mosaic disease (CMD), transmitted by the whitefly, *Bemisia tabaci*, is the most important viral disease that affects cassava in Cameroon. It is present in all cassava production basins (Akinbade et al. 2010). Previous studies confirmed the occurrence of African Cassava Mosaic Virus (ACMV), East African cassava mosaic Cameroon virus (EACMCV) and East African cassava mosaic virus (EACMV) in CMD etiology (Fondong et al., 2000). The Ugandan variant of the East African cassava mosaic virus (EACMV-UG) which is a very virulent recombinant strain is responsible for the severe CMD epidemics in East and Central Africa. This variant was also reported in East Cameroon in 2009 (Akinbade et al. 2010). These CMV species/strains frequently occur in mixed infections and act in synergy, resulting in more severe symptoms (Fondong et al., 2000; Casinga et al., 2018).

The government, through the Institute of Agricultural Research for Development (IRAD) and in collaboration with the International Institute of Tropical Agriculture (IITA) developed and introduced resistant/tolerant varieties to CMD. Through the Ministry of Agriculture and Rural Development, with support from international organizations, the government has set up structures and implemented many projects/programmes aiming at reducing cassava viral threats. This involved the multiplication and certification of improved cassava varieties and vulgarization of disease management strategies. Since 1980, besides local varieties, over forty improved varieties have been developed and distributed in all agro-ecological zones in Cameroon.

Despite all these efforts, there are some other threats like Cassava Brown Streak Disease (CBSD) that has not yet been detected in Cameroon, but are known to occur in DR Congo (Casinga *et al.*, 2018)).

On- going initiatives for the management of the identified threats are centered on the following actions:

- Development and diffusion of resistant/tolerant cassava varieties;
- Field surveys and diagnosis of some virus species/strains infecting cassava;
- Development of an efficient cassava seed system;
- Training of extension workers and farmers on the production and use of healthy planting materials and the intensification of awareness on cassava viral diseases, their symptoms, vectors and management techniques;
- Enforcement of legislation regulating exchange and circulation of planting materials between regions and countries;

Implementing the following actions could help in protecting the national cassava production:

- Put in place a functional national surveillance system for cassava viral diseases;
- Reinforce the capacity of staff and laboratories for easy detection of cassava viral diseases;
- Elaborate a national intervention plan;
- Set up a crisis management team to respond in case of outbreaks.

I.2. Mapping of key stakeholders

I.2.1. Along cassava value chain

	Research & Development	Inputs	Production	Storage and Transport	Transformation	Marketing and Promotion
Public	MINRESI (IRAD, CNDT) IITA (Also intervenes for surveillance) CIRAD, DFID Six (06) Public Universities	IRAD MINADER	MIDENO, SOWEDA, etc.	Ministry of transport, Municipal councils, Ministry of public works	MINPMEESA MINADER University of Ngaoundéré. CNDT IRAD CENEEMA	Several ministerial departments : MINADER, MINRESI, MINCOM, MINPMEESA, MINCOMMERCE
Private	Private Universities and institutes (Catholic University of Buea, CATUC Bamenda, Institut Supérieur d'Agriculture et de gestion d'Obala, etc.)	Seed Multipliers Dealers in agro-chemicals Farmers Associations Commercial Banks and micro finances	Individual farmers Farmer organisations (NOWEFOR, CNOPCAM, FUGIMA, PLANOPAC, RHORTICAM, GIC Promise de Bityli, SCOOPMAN, SCOOPCA APMAB, SOCOOPROMAN, COPRODIMA, IKILIROT COOP, EKOVIP, Agro hub Buea, AGROVISC etc.	Drivers Drivers' unions Farmers' Cooperatives Wholesalers Retailers Truck pushers/bikes riders	Processors Millers Farmers Commercial Banks and micro finances	Consumers, Whole sellers and retailers, Trade associations, Cooperatives, Exporters, Restaurants, Supermarkets Platform, Commercial Banks and micro finances

1.2.2. Other relevant actors

Risk management operations are carried out at a low profile in Cameroon, though there is presently no structure that harmonizes this activity.

Government actors	Private sector	Civil society organizations/NGOs	Bilateral and multilateral partners	Others
Ministry of Agriculture and Rural Development (MINADER) Ministry of Scientific Research and Innovation (MINRESI) Ministry of Transport (National Meteorological Office) National Institute of Statistics Ministry of Economy, planning and Regional Development (MINEPAT) Ministry of Communication (MINCOM)	Seed multipliers Service Providers		World Bank European Union African Union through African Phytosanitary Council Food and Agricultural Organization (FAO) International Fund for Agricultural Development (IFAD) Bill and Melinda Gates Foundation USAID French Development Agency IITA	

Financial partners involved in the establishment and/or operation of an EOC are:

- Bill and Melinda Gates Foundation
- World Bank will provide finances to manage cassava viral threats crisis.
- African Development bank will provide finances to develop resistant cassava varieties
- DFID will provide finances and scientific expertise in the management of cassava viral threats crisis.
- USAID will provide financial and material support for the management of the cassava viral threats crisis.
- African Union. The African Union brings together the plant protection organizations of the member countries in the Inter-African Phytosanitary Council (IAPC). The IAPC coordinates plant protection procedures in Africa and promotes the exchange and synthesis of information and facilitates collaboration between the National Organizations for Plants Protection from fifty three (53) countries of the continent, taking into consideration:
 - Technical justification of phytosanitary measures;
 - Sustainability of effective plant protection practices;
 - The scientific harmonization of methods and procedures;
 - Protection of plant resources against the entry, establishment and spread of regulated pests and diseases, while facilitating intra-/inter-regional trade.

Technical

- The staff of Ministry of Agriculture and Rural Development actively involved in CMD management. They are in the field and would furnish relevant information concerning the disease situation to the EOC. Vigilance of all and Sundry (Article 16 of Law No 2003/003 of 21st April 2003 relating to phytosanitary protection
- The Ministry of Scientific Research and Innovation is actively involved in crisis management of cassava viral threats through strengthening of laboratory diagnostic of cassava virus and viral disease management. It also provides clean basic planting material
- The Ministry of Communication is actively involved in crisis management of cassava viral threats through its media to create public awareness.
- Universities collaborate in the crisis management of cassava viral threats through strengthening of laboratory diagnosis of cassava virus and viral disease management.
- Food and Agricultural Organization of the United Nations (FAO) is actively involved in funding programs and providing food aid to the affected population.
- International Fund for Agricultural Development (IFAD) is actively involved by providing funding for the establishment of new farms (the recovery phase of the crisis).

- International Institute of Tropical Agriculture (IITA) actively collaborates in the crisis management of cassava viral threats through strengthening of laboratory diagnosis of cassava virus and viral disease management.
- Alliance for Green Revolution in Africa (AGRA) is actively involved in cassava viral threats management by providing funding for the establishment of new farms (the recovery phase of the crisis).

I.3. Risk Assessment

Names of the main threats	Level of risk (Low / Moderate / High)	Current consequences on crops	Probability of outbreak (Low / Moderate / High)	Further consequences if nothing is done
Fungal threats				
Cassava anthracnose disease (CAD)	High	Loss of high quality planting material Stem breaking	Moderate	Yield loss
<i>Fusarium</i> and <i>Phytophthora</i> rot disease	High/Moderate	Tuber rot	Moderate	Yield loss
<i>Botriodiplodia</i>	Low	Basal stem rot	Low	Yield reduction
<i>Cercospora</i> leaf spot	Low	Leaf spotting	Low	Yield reduction
Bacterial threats				
Bacterial leaf blight	High	Leaf wilting	High	Total leaf drying, plant death, Yield loss
Viral threats				
Cassava mosaic disease (CMD)	High	Leaf curling, twisting and discoloration 20-50% losses	High	Plant stunting, leaf area reduction, leaf Up to 90%
Other threats				
Cassava green mites (CGM)	High	White leaf spotting	High	Leaf stunting, tip drying, yield reduction
African Root and tuber scale (<i>Sticococcus vassierei</i> Richard)	High	Poor plant development	Moderate	Poor stem sprouting, growth reduction, yield reduction
Whiteflies	High	Transmission of viral disease	High	Increased virus infected plants, yield reduction
Rodents	Low	Tuber eating	Low	Serious yield reduction
Termites	Moderate	Low sprouting of cutting	Moderate	Serious yield reduction

I.4. Current risk management process

Actions currently taken (*)

Type of risk	Prevention, Mitigation, and Preparedness	Detection and Response	Monitoring & Evaluation
CMD	Development/introduction/vulgarization of CMD resistant/tolerant varieties Training and sensitization actors on phytosanitary protection legislation, use of disease free planting materials Enforcement of the cassava seed certification process	Periodic field surveillance and laboratory diagnosis by researchers and extension agents Enforcement of phytosanitary protection legislation and seed activity legislation Screening of new varieties for resistance Eliminate infected plants	CMD incidence and severity by researchers during field trials and surveillance Seed inspector reports Number of people trained and training reports Number of certified cassava cuttings distributed All information is shared through the MINADER extension system
Cassava anthracnose disease (CAD)	Sanitation, use of disease -free cuttings	Presence of cankers on stem and petioles Eliminate infected plants	CAD incidence and severity by researcher during field trials and surveillance Seed inspector reports
<i>Fusarium</i> and <i>Phytophthora</i> rot disease	Ridge building or soil mounding in wet areas, timely harvest of mature roots	Leaf and stem drying Presence of a whitish mycelium at the base of the infected stem Eliminate infected plants	Report on incidence and severity by researcher during field trials and surveillance
<i>Botriodiplodia</i>	Sanitation	Presence of a whitish mycelium at the base of the infected stem Eliminate infected plants	Report on incidence and severity by researcher during field trials and surveillance
Bacterial leaf blight	Sanitation	Wilting and drying of leaves	Report on incidence and severity by researcher during field trials and surveillance
Cassava green mite (CGM)	Sanitation	Small leaf spots, extreme reduction of young leaves, drying of stem tips	Report on incidence and severity by researchers during field trials and surveillance

(*) For each of the threats rated above as high and at least moderate

I.5. Gap Assessment

I.5.1. Strengths

Policy Environment

There exist some policies aimed at risk mitigation in Cameroon. Law N°2003/003 of 21st April 2003 fixes modalities for the fight against pests and diseases (phytosanitary protection). Article 9, of the law prohibits the import and export of plants and plant products contaminated with pests and diseases. Moreover, all plants and products destined for export or import are expected to be accompanied by a phytosanitary certificate issued by the competent authority. The law (article 10) further states that the importation and exportation of plant materials destined for planting and/or multiplication should be carried out only at official entry points. In article 16, the law calls on all and sundry for vigilance and the destruction of all material infected with pathogens. In addition to these laws, there are other Prime Ministerial decrees signed in 2006 relating to phytosanitary activities:

- Decree No2005/0769/PM of 06th April 2005 relating to the organization of a National Phytosanitary Council.
- Decree No2005/0770/PM of 06th April 2005 fixes phytosanitary control methods.
- Decree No2005/3091/PM of 29th August 2005 lays down the modalities for production, quality control and marketing of seeds
- Decree no2005/0771/PM of 06th April 2005 fixes modalities for the execution of plant quarantine operations.

Beside these laws and decrees of application, there are some decisions signed by MINADER:

- Decision N°042/06 / MINADER / CAB of May 10, 2006 instituting a phytosanitary certificate;
- Decision No0274 / MINADER / CAB of 19 March 2013 concerning the approval of printed phytosanitary certificates and laying down the procedures for their issue.

Within the formal seed sector, phytosanitary activities are placed under the responsibility of seed certification officers and researchers to remove and destroy all material carrying pathogens or identified as infected. Control is guaranteed as the farmers declare their activity and plots are visited by Inspectors from MINADER that ensures that farms are free from disease symptoms and would rogue out diseased plants and discard or place the entire farm under quarantine when the infection surpasses the recommended level. For cassava pre-basic and basic plants, the maximum accepted percentage of on-farm plants with CMD symptoms is 0.1. For certified plants this accepted percentage is 0.5.

Extension service

There are several public and private institutions found at all levels of Cameroon including the most remote areas. For instance, the extension service of MINADER has workers across the country working closely with farmers and their farms. There is also a vibrant private sector that works closely with rural farming communities;

Basic infrastructure

There are some basic infrastructures (buildings, unfurnished laboratories, etc.) available across the different regions/agro-ecological zones of the country which could be made available for all actions aimed at mitigating Cassava Mosaic Virus.

Human Resources

Some human resources are available at both public and private research and development institutions in Cameroon that could be harness to support initiatives geared at mitigating CMD spread;

Research and innovation

There is a wide range of public and private institutions conducting research on Cassava including the development of improved varieties. These include IRAD, IITA, CIRAD, Universities, etc. For instance, cassava varieties resistant to CMD were introduced to farmers in the country and have helped to reduce the severity of CMD. Other preliminary research works include the MINRESI/IRAD/C2D project entitled “Enhancing Cassava Productivity in Cameroon through the use of Improved Variety”. Quarantine measures have also been taken to prevent the spread of the Ugandan strain of the East Africa Cassava Mosaic Virus from the East Region of Cameroon (Akinbade et al, 2010).

Awareness

From time to time and as a component of many projects especially the C2D Cassava project, farmers and extension agents are trained on simple methods of identifying pests/diseases and simple management techniques such as the use of clean planting materials of improved varieties.

I.5.2. Weaknesses

- Difficult to identify disease on the cutting because disease symptoms are expressed only on leaves;
- Non-respect of the Law No2001/014 of 23rd July 2001 relating to seed production and marketing and Prime Ministerial Decree No2005/3091/PM of 29th August 2005 laying down the modalities for production, quality control and marketing of seeds that allows free flow of planting and vegetative material within the national territory; movement of persons and goods within the country is difficult to control;
- Difficulty in monitoring and controlling cuttings produced from the non-certified seed producers;
- Insufficient competency and limited number of human resources available to institutions with potentials to contribute to the prevention of CMD;
- Phytosanitary officers are located only at official entry and exit points. However, there are many other clandestine routes where there is no control;
- Lack of standard laboratories for molecular detection and a rapid identification system for cassava viral species and strains;
- Insufficient funding;
- No monitoring or national surveillance system is yet in place;
- Incomplete map showing list of pathogens and their geographical distribution within the national territory;
- Limited meteorological stations/network to generate climatic data to predict and monitor migration of whiteflies, the vector for these viral diseases;
- Non-availability of a national Centre for the collection, processing and management of data in order to develop early warning signals to mitigate CMD outbreaks.

I.5.3. Key takeaways

- Construct, rehabilitate and equip laboratories for rapid detection and identification of CMDs;
- Recruit and build capacity of researchers, technicians, extension workers and farmers on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control;
- Put in place a national Centre for the collection, processing and management of data in order to develop early warning signals to mitigate CMD outbreaks;
- Evaluate the status of CMD in Cameroon and update the map showing list of pathogens and their geographical distribution within the national territory;
- Sensitize stakeholders on policies and procedures relating to the modalities for production, quality control and marketing of seeds that allows free flow of planting and vegetative material within the national territory; movement of persons and goods within the country is difficult to control;
- Set-up meteorological stations/network to generate climatic data to predict and monitor migration of whiteflies.

Currently, there is a poor viral disease monitoring system for crops in Cameroon. There is therefore the need to put in place one for cassava that can eventually be extended to other key crops.

II. STRATEGIC OBJECTIVES AND VISION OF THE NATIONAL RESPONSE PLAN

II.1. Vision

Cassava value chain becomes competitive through sustainable disease management strategies.

II.2. Strategic Objectives

Strategic Objective 1

Obtain government and stakeholder engagement for developing a concrete action plan against cassava viral threats.

Activities:

- Meet with government authorities to seek their approval to develop a national response plan against cassava diseases;
- Organize national workshops to develop the national response plan against cassava diseases.

Strategic Objective 2

To strengthen in-country capacity for improved cassava viruses surveillance for prevention, early detection, eradication and continued management of cassava viral threats.

Activities:

- Organize exchange visits to other WAVE participating countries;
- Recruit researchers, phytosanitary officers and seed inspectors, technicians/extension workers, quarantine and non-quarantine personnel and farmers to work on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control;
- build capacity researchers, phytosanitary officers and seed inspectors, technicians and extension workers, quarantine and non-quarantine personnel and farmers on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control;
- Construct, rehabilitate and equip laboratories for rapid detection and identification of CMDs;
- Equip both seed and phytosanitary inspectors with quick identification kits
- Set up a national system for the collection, processing and management of data in order to develop early warning signals to mitigate CMD/CBSD outbreaks;
- Update the list of pests and diseases present in Cameroon to produce a quarantine pest and disease list;
- Evaluate the status of CMD/CBSD in Cameroon and update the map showing list of pathogens and their geographical distribution within the national territory;
- Assess the (potential) impact of CMD/CBSD on the Cameroon and sub regions' Economy
- Set-up meteorological stations/network to generate climatic data to predict and monitor migration of whiteflies.

Strategic Objective 3

To raise awareness among cassava farmers and other stakeholders on the cassava viral threats.

Activities:

- Produce and disseminate communication material on viral threats;
- Sensitize stakeholders on policies and procedures relating to the modalities for production, quality control and marketing of seeds that allows free flow of planting and vegetative material within the national territory; movement of persons and goods within the country is difficult to control.

Strategic Objective 4

Put in place collaborative strategies to prevent and prepare for CBSD attack on Cassava in Cameroon.

Activities:

- Establish an effective collaborative framework for CBSD surveillance between IRAD, MINADER, Ministry of Transport, MINRESI, etc.
- Develop regulations, guidelines and standard operation procedures about CBSD prevention and preparedness.

Strategic Objective 5

To ensure the production of healthy cassava planting material

Activities:

- Breed or introduce, screen for virus resistant varieties;
- Multiply and disseminate disease free planting material;
- Build the capacity of researchers, phytosanitary and seed inspectors, farmers and extension workers on the production of healthy cassava planting material;
- Train stakeholders on integrated pest management systems of Cassava pests, diseases and vectors.

Strategic Objective 6

Coordinate, Monitor and evaluate the implementation of the project in Cameroon

Activities:

- Coordinate the implementation of the activities in Cameroon;
- Manage and ensure and judicious use of human and financial resources allocated for the implementation of the project;
- Monitor and Evaluate the realization of the deliverables of the project;
- Acquire and allocate Materials and infrastructure for the implementation of the project;
- Organize stakeholder meetings and outreach programs ;
- Write and disseminate activity reports.

III. STRUCTURE OF THE EMERGENCY OPERATIONS CENTER (EOC)

III.1. Institutional anchoring

The EOC will be anchored within IRAD, an Institute with a strong history of collaboration with the various rural-sector ministries like MINADER, MINFOF, MINEPDED and MINEPIA. In effect, IRAD is a public establishment with legal personality and financial autonomy. It is under the technical and financial supervision of the Ministry of Scientific Research and Innovation and the Ministry of Finance of Cameroon, respectively. IRAD's mandate is to develop a scientific program around the country's priority development axes, based on the real needs of all stakeholders, both at the national level and in each of its agro-ecological zones as well as to ensure the sustainable management of natural resources and the conservation of the environment. Therefore, IRAD responds to the concerns of development stakeholders (farmers, herders, processors of agricultural, forestry and livestock products, traders) and promote agricultural development in the areas of plant, animal, fish, wildlife, forest and environmental production. It is worthy to note that IRAD has in the past years been responsible for or associated with the implementation of many projects dedicated to cassava production, transformation and multiplication as well as the control of its pests and diseases. Notable amongst these are:

- The “sustainable cassava production in Central Africa and market integration” project, jointly funded by the European Union and CEMAC (2011 – 2018) and managed by the Regional Applied Research Pole for the Development of Agricultural systems in Central Africa (PRASAC), a network of six agricultural research institutions in Central Africa (Cameroon, Central African Republic, Congo, Gabon, Equatorial Guinea and Chad) ;
- The Project on “Multiplication of quality cassava planting materials” funded by the government of Cameroon (2005 – 2010) in the framework of an enlarged national seed multiplication programme under the “Heavily-Indebted Poor Country Initiative (HIPC);
- A project on cassava was executed in the framework of the Research Support Program of the Debt Reduction and Development Contract (C2D/PAR), funded by the French Agency for Development (AFD) from 2014 to 2017. This project was meant to increase cassava productivity through multiplication and dissemination of improved seeds. At the end of the project, the most serious cassava diseases and pests were identified, seed farms of high-yielding varieties were established, disease resistant and other performant varieties were created, protocols and extension materials on improved cultivation practices were elaborated and distributed, several extension agents were trained on cassava production and processing, and improved planting materials were distributed to interested stakeholders.

Presently, we have two pest and disease response plans under operation, in collaboration with MINADER these are:

- Fall armyworm
- Banana bunchy top

Several others are under elaboration, and these are conducted in collaboration with the various sectoral administrative units, e.g.:

- Fruit fly;
- Tomato leaf miner *Tuta absoluta*;

Based on the existing collaboration between IRAD, MINADER and other administrative units in disease/pest management and emergency response strategies, e.g. The fall armyworm case, we hope to build on the structures in place to make the EOC functional.

III.2. Governance

The EOC will be hosted by IRAD. To give the EOC legitimacy, decisions of the board of directors of IRAD need to be signed. Then a decision of the Director General of IRAD shall appoint members of the EOC.

III.2.1. Brief description of Host Structure (IRAD)

The Institute of Agricultural Research for Development (IRAD), established by Decree No. 96/050 of 12 March 1996 on the organization of IRAD, and reorganized by that of No. 2002/230 of 6 September 2002, is a Public Establishment with legal status and financial autonomy, with management bodies, a Board of Directors and a General Management. IRAD is under the technical supervision of the Ministry of Scientific Research and Innovation (MINRESI) and under the financial supervision of the Ministry of Finance (MINFI).

It is responsible for conducting research activities aimed at promoting agricultural development in the areas of plant production and protection, animal, fisheries, forestry and environmental production and protection, as well as food and agro-industrial technologies. Pest and disease management and mitigation is also a key mission of IRAD. The Institute of Agricultural Research for Development has for its functioning a Board of Directors and a General Management.

Table 1: Agro ecological Zones (AEZ) covered by of IRAD

Zone	Agro ecological zone	Headquarters	Number of stations	Number of sub stations
1	Sudano-Sahel	Maroua	02	08
2	High Guinean Savanah	Wakwa	01	04
3	Western highlands	Bambui	02	03
4	Monomodal humid forest	Ekona	02	06
5	Bimodal humid Forest	Nkolbisson	05	09
TOTAL			12	30

III.2.2. Mandate of the EOC

To develop and maintain a cassava viral riposte system, provide crisis resources support, coordinate information and communication and ensure that appropriate policies are considered in the development of operational strategies during diseases surveillance and crisis management.

IV. ORGANIZATIONAL OVERSIGHT OF THE EOC

The board of directors of IRAD, the administration of IRAD and Department of Regulation and Quality Control of Inputs and Agricultural Products (DRCQ) and WAVE are responsible for setting policy and monitoring the progress towards the accomplishment of the EOC objectives.

IV.1. Organizational structure

IV.1.1. Departments and governing organs

The Governing organs of the EOC will be the Board of Directors of IRAD and the Directorate of quality control and regulations of agricultural products. The EOC will have main center in IRAD headquarters Yaoundé under the Directorate of Scientific Research. There shall also be five zonal sub centers – located in the 5 regional scientific centers of IRAD based on the five agro ecological zones of the country to coordinate at the level of the different agro ecologies. Each sub center of the EOC will be managed by an EOC Coordinator who will have day-to-day responsibility for management and implementation. The five EOC Coordinators at AEZ levels, the national coordinator of the EOC, the representatives of the Department of Regulation and Quality Control of Inputs and Agricultural Products (DRCQ) and other scientists appointed by the DG of IRAD will form the management unit of the EOC and together they will be primarily responsible for delivering the objectives and targets in the Cameroon action plan for cassava viral disease threats.

IV.1.2. Reporting and decision-making structure

In all the AEZ, there will be a multidisciplinary team of researchers, quarantine service and extension staff of MINADER and other stakeholders responsible for:

- Programming Operations
- Risk Management and Decision Support
- Management, Oversight, and Accountability

The team coordinator at the AEZ level, will report to the national coordinator of the EOC, who will in turn report to the project management unit/task force.

IV.1.3. Organizational tree

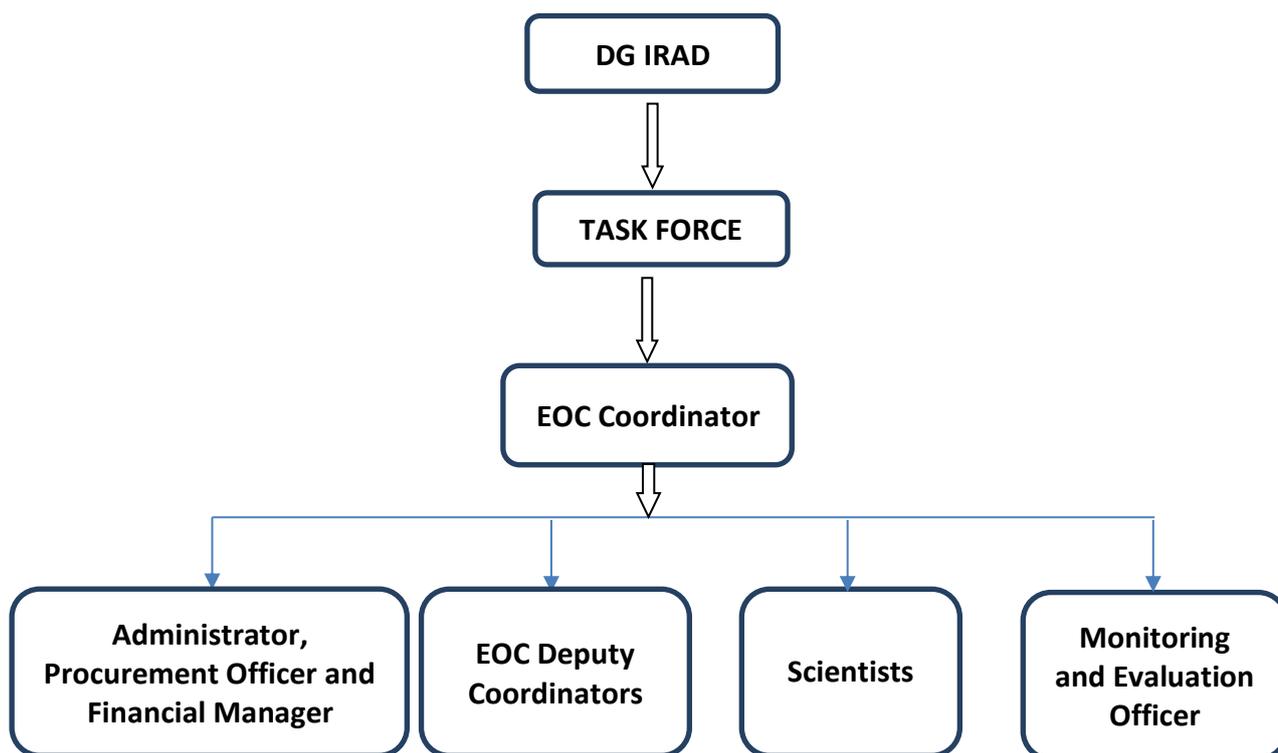


Figure 1: Organisation structure of EOC

IV.2. Human Resources

Professional staff and volunteer farmers will be required for cassava viral disease threat surveillance and disaster management. In each phase of the emergency-management cycle, different skills will be required for a range of activities, from monitoring and surveillance, through prevention and mitigation, to relief and recovery. Training will be essential to ensure that professional staff and volunteers have the skills and awareness necessary for pre-and post-disaster activities.

IV.2.1. Core Competencies

- 01 Task Force: Made up of 10 members and shall comprise DG/IRAD, DRS/IRAD, MINRESI, MINADER, MINEPAT, WAVE Executive Director, WAVE Team Leader, Representative of IITA, EOC National Coordinator and Representative of Platform of Cassava Value Chain.
- WAVE Team Leader
- 01 EOC Coordinator (IRAD researcher)
- 05 Deputy Coordinators (essentially researchers) in 5 Agro-ecological Zones,
- 06 Scientists (Epidemiologist, Agronomist, entomologist, Biotechnologist, Science Communicator, Agro-economist)
- 01 Monitoring and Evaluation Specialist
- 01 Administrator
- 01 Financial Manager

- 01 Procurement Officer
- 06 Drivers
- 06 Secretaries
- 02 Laboratory Technicians, and
- 10 Extension workers/Field Technicians (2 in each AEZ)
- A GIS Expert will be solicited from time to time as consultant.
- In the event of outbreaks and when needed, additional human resource will be recruited

For Prevention, mitigation and preparedness, the following staff will be needed:

- Management staff will include 01 Administrator, Financial Manager, 06 Secretaries, and Monitoring and Evaluation Officer.
- Research team will be composed of Epidemiologist, Agronomist, entomologist, Biotechnologist, Science Communicator, Statistician
- Extension team will include extension agents, communication specialists, pilot farmers, quarantine officers.

IV.2.2. Roles and Responsibilities

- a. 01 Task Force: Made up of 10 members and shall comprise DG/IRAD, DRS/IRAD, MINRESI, MINADER, MINEPAT, WAVE Executive Director, WAVE Team Leader, Representative of IITA, EOC National Coordinator and Representative of Platform of Cassava Value Chain. This shall be the governing structure of the EOC. With the proposition of the EOC, the Task Force shall recruit the Deputy EOCs and Scientists. It shall oversee the running of the EOC
- b. WAVE Team Leader He shall make sure the terms of reference of the EOC respects that of WAVE and makes sure the implementation of the activities are in line with the terms of reference.
- c. EOC Coordinator. Oversees the implementation of the National Action Plan. Reports (quarter, semester and yearly) all activities to the DRS IRAD and WAVE. Makes proposals for recruitment and annual evaluation of staff of the EOC
- d. 05 Deputy Coordinators. Oversees the implementation of the National Action Plan within the AEZs. Reports (quarter, semester and yearly) all activities to the Coordinator. Conducts annual evaluation of staff of the EOC in the AEZ.
- e. 06 Scientists. In their various domains make regular visits to collect data necessary for obtaining expected results as elaborated by as on the terms of reference for their recruitment. Signal possibility of threats and mitigation procedures. Write monthly, quarterly and semester reports to the Coordinator.
- f. 01 Monitoring and Evaluation Officer. Makes sure the roadmap of the EOC is respected as drawn and advises Coordinator on timelines and lapses

- g. 01 Administrator and 01 Procurement Officer. Oversees in collaboration with the coordinator the day to day running of the EOC. Answers to the Coordinator
- h. 01 Financial Manager. Makes sure that budgetary lines are respected and financial records are properly kept.
- i. 06 Drivers. One for each coordinator. Makes sure vehicles are in proper conditions.
- j. 06 Secretaries. One for each coordinator. For book keeping, consolidation of reports, printing, binding.
- k. 02 Laboratory Technicians. Work in the laboratory to analyze samples for the identification of pests and diseases
- l. 10 Field Technicians. Work with scientist on the field to identify threats and collect samples for onward transmission to laboratory.
- m. A GIS consultant. To consolidate data and update maps on disease spread
- n. Addition human resource will be recruited as need arises.

IV.2.3. Recruitment Strategy

Task Force will determine the national need based on priority intervention zones on the required technical, management and support staff necessary.

After determination by the National Coordinator, a list of positions will be submitted to the Task Force for recruitment or assignment of scientists to the project.

Subsequently, an annual evaluation will be carried out to assess the personnel need of the project, and possible recruitment of more staff.

IV.2.4. Training

Annual evaluation of personnel performance will be conducted at different levels as follows:

- Task Force shall evaluate the National Coordinator,
- National Coordinator shall evaluate Researchers, Zonal Coordinators and officials at national level,
- Zonal Coordinators shall evaluate staff at zonal level.

Specific trainings at specialized institutions will be requested for selected staff to undertake. Also, there will be refresher courses for professionals on a semester basis to give room for career advancement.

IV.3. Financial and material resources

IV.3.1. Financial needs

For the EOC to fully operationalize, finances will be required to conduct capital expenditure, operations, and trainings, take care of some overheads and contingencies. These financial resources would be used as shown on the table below:

Table 1 : Areas of financial needs for the EOC

1. CAPITAL EXPENDITURE	2. OPERATING EXPENDITURE	3. TRAINING COSTS
Rehabilitate Buildings	Salaries/incentives	Monitoring & Evaluation
Laboratory and Office Fixtures	Coordinator	Crisis Management
Computers	Deputy Coordination	Regional visits
Vehicles	Secretaries (06)	Human Resource
Office Equipment (Camera, projector, printers, GPS, etc)	Administrator/Procurement Officer	Internships
Generator for Laboratory	Finance Manager	Task Force
Laboratory Equipment (PCR, centrifuge, refrigerators, electrophoresis tank and powerpack, water bath, gel viewer, microwave, etc.)	Scientists: Epidemiologist, Agronomist, entomologist, Biotechnologist, Science Communicator, Statistician	
Meteorological Stations	Drivers and 12 Support	
Motor Bikes and accessories	Technicians (10 Field and 02 Laboratory)	
	Monitoring and Evaluation Officer	
	GIS Expert	
4. OVERHEAD COSTS	5. OTHER COSTS	6. CONTINGENCY BUDGET
Rent	Communication	Honorarium to farmers
Electricity	Consulting fees	Daily Subsistence Allowance
Insurance (Vehicle and bikes)	Legal Services	Fuel
Telephone bills	Database Management System	Additional Human Resource
Internet	Events and conferences:	Additional Material
Fuel and lubricant		Sitting allowances
Daily Subsistent Allowance		
Office Stationery		

IV.3.2. Material Needs

Second year, rehabilitate coordinator, administrator and secretary office

For the setup and for the operations:

- IT equipment (Computer, software, computer accessories, internet),
- Stationery,
- Buildings and furniture to host the laboratory and offices,
- Laboratory equipment, reagents and consumables as well as field equipment (sample collection kits, sample storage boxes, field boots and coats, etc.), Generator
- Vehicles for transportation of staff and other personnel during surveillance and crisis management.

IV.3.3. Resource management plan

The Emergency Operation Centre's main Secretariat will provide secretariat support to the whole Emergency Operation Centre Management Team. Specific responsibilities include:

- organize or meetings of the EOC Management Team, in accordance with the daily, weekly, monthly or quarterly schedule of activities, as advised by the EOC Director
- create and maintain records (including minutes) of these meetings and distribute as appropriate

Under normal disease surveillance, the secretariat will ensure that the resources are disbursed to the staff on time following the agreed plan and in this case the team head will maintain a detailed, itemized account showing: date and time of request, authority of requesting team, activity to be carried out, and date and time and any further remarks.

During a crisis situation, the secretariat will ensure that contingency arrangements are in place to enable the immediate authorization of funds and resources that may be required in cassava viral/disease crisis for:

- purchase of emergency supplies and equipment;
- transport for emergency operations personnel (and equipment);
- accommodation of emergency operations personnel;
- catering/meals for emergency operations personnel;
- contractors/service providers (*e.g.* charter of helicopters, machinery hire);
- establishing and maintaining telecommunications and/or other modes of communication;
- other miscellaneous expenditure

However, the team leader of any operation will subsequently provide to the secretariat detailed itemized account showing how the funds and resources were used.

IV.4. Financial procedures

IV.4.1. Inventory of procedures

INVENTORY OF PROCEDURES
budget Procedures
<i>Elaboration of budgetary calendar</i>
<i>Elaboration and adoption of budget</i>
<i>Execution/follow up of budget and budget control</i>
<i>Elaboration and adoption of accounts and annual performance report</i>
Procedures for infrastructural management
Procedure for the elaboration of investment program
Procedure for management of infrastructure files
Treasury procedures
<i>Revenue intake</i>
Revenue intake in cash
Revenue intake by cheques
Revenue intake by bank transfer
<i>Disbursement</i>
Disbursement in cash
Disbursement by cheque
Disbursement by bank transfer

IV.4.2. Rapid allocation of financial and material resources

WHAT ARE THE PROCEDURES NECESSARY TO ENSURE A RAPID ALLOCATION OF FINANCIAL AND MATERIAL RESOURCES IN CASES OF CRISIS?

At the beginning of each fiscal year, in accordance with the requirements of the Ministry of finance circular on the execution and control of the execution of the State budget, the Board of Directors, the deliberative organ of IRAD, at the request of the Director General, takes a decision authorizing him to make available to the operational structures, financial and material resources necessary for the conduct of field activities, most of which are based on the agricultural calendar. This measure is followed by accreditations from the Chief Operations Officer, who are responsible for the operational structures. In addition, the Director General may, in case of need or crisis, set up funds in advance for the rapid and real-time execution of expenses related to research activities that should not suffer from normal budget execution procedures. Similar measures may also be taken in accordance with the relevant procedures for the allocation or provision of equipment necessary for the smooth performance of research activities.

IV.4.3. Prioritization for disbursement of resources

What is the order of priority for disbursing resources for the functioning of the projects?

- Disbursement in cash
- Disbursement by cheque ;
- Disbursement by bank transfer.

IV.3.4. Financial control and accounting mechanisms

The budget is executed / monitored and controlled according to the standards by the authorized persons. The control can be done a priori and / or a posteriori. The control a priori envisages control of the execution of the finance laws, both in credits and workforce, and the sustainable nature of the multi-year programming and management in progress, by the identification and prevention of financial risks as well as only by analyzing the explanatory factors of the expenditure and the cost of public policies. As for the ex-post control, it is done after the execution of the expenditure for the purposes of the clearance of the latter. There are two levels of control: internal and external.

a). Internal control

The Director General intervenes in this process as an authorizer that is to say as a judge of the desirability of the necessity and the relevance of the expenditure underpinned by the needs expressed to him by the researchers or managers of research projects. At the end of each budget year, he draws up an administrative account and a management-materials account which he submits for validation by the Board of Directors at the session of the accounts for the budgetary year concerned.

The financial controller and the accounting officer act in this process as representatives of the Ministry of finance which is the supervisory institution of the Institute. As such, they are judges of the regularity of the expense incurred by the Chief Executive Officer.

More specifically, the Specialized Financial Controller is responsible for:

- Control of revenue authorities of its home structure, in collaboration with the Accountant.
- Preparation of quarterly budget implementation reports
- Clearance of employment accounts of credit unions before transmission to Accounting Agency
- Drawing up of employment accounts for validation by IRAD's Board of Directors

While The Accountant is the custodian of the funds, he is both a receiver and a payer. For this purpose, he checks among other things:

- the quality of authorizing officer;

- the availability of credits on the lines used
- the correct imputation of the expense;
- the certification of the service by the authorizing officer;

In addition, he develops:

- Bank reconciliation reports, that allows for the verification of the effective reciprocity of bank or treasury accounts;
- Report of a cash stop;
- Management accounts for validation by IRAD's Board of Directors

b). External control plan

External control is exercised by the Ministry of finance and by the other institutions of the State concerned such as superior state control Ministry, Chamber of Accounts of the Supreme Court, CONAC, ANIF, Parliament, etc.).

With regard to the financial supervision, it ensures the control of the execution of the budgetary allocations through its three main units which are:

- the General Directorate of the Budget,
- the General Directorate of Treasury and Financial and Monetary Cooperation,
- the General Tax Directorate,

The Directorate General of the Budget carries out checks to ensure that the authorizing officer of the budget of each establishment takes all the necessary measures to make the reconciliation statements necessary for an adequate readability of the accounts.

The General Directorate of Treasury and Financial and Monetary Cooperation is interested, just like the Audit Bench of the Supreme Court, in the regularity of the presentation of management accounts on figures and documents, at the end of each financial year.

The General Tax Directorate verifies the effectiveness of tax deductions and their regular repayment to the public treasury.

For the other controls, they are generally ordered in case of suspicions or denunciations. They may also be carried out on the initiative of the said administrations in the framework of their sovereign missions.

IV.4. Partnerships

The operations of the EOC may be funded by the government, BMGF or other donors. In addition to IRAD, the technical expert groups will be composed of the following:

a). Other Research institutions (IITA and Universities)

These institutions in partnership with IRAD develop and introduce new varieties, clean and maintain foundation seeds and supply basic seeds to commercial seed producers. Since 1980, besides local varieties, over forty improved varieties have been developed and distributed in all agro-ecological zones in Cameroon. These institutions in partnership with IRAD also train farmers and other stakeholders on disease prevention and management strategies in the country.

b). Ministry of Agriculture and Rural Development (MINADER)

MINADER ensures the development, implementation and evaluation of Government policy in the fields of agriculture and rural development. At the central level, two directorates are concerned with phytosanitary protection:

- The Department of Regulation and Quality Control of Inputs and Agricultural Products that has 3 sub-divisions:
 - Sub-Directorate for the Regulation of Pesticides,
 - National Laboratory for Analysis and Diagnosis,
 - Sub-Directorate for Seed and Plant Quarantine Regulations,
- The Agriculture Development Directorate has the Phytosanitary Interventions Department

At local level there are:

- 10 regional services of quality control of inputs and agricultural products;
- 10 regional phytosanitary bases and divisional brigades;
- 44 posts of phytosanitary police located at entry and exit points of national territory (international airports, ports, terrestrial boundaries) ;
- 80 phytosanitary inspectors and certified inspectors.

Other roles of MINADER are:

- Trains commercial seed producers, control their farms and certify seeds that are produced or marketed in Cameroon through its inspection and certification services
- Distributes foundation seeds to seed multipliers (farmers group and Associations).
- Distributes quality seeds (disease free) to farmers through programmes and projects: PNDRT, PIDMA, Rumpi, SOWEDA, GP-GERUDEP.

c). Seed multipliers

Multiply foundation seeds to sell to farmers who plant for production. This group is made up of Farmers cooperatives, CIGs, NGOs and individual producers. Their activity is monitored by MINADER who certifies their farms for quality.

Pilot /volunteer Farmers: This group of farmers assist research in on farm activities and other outreach programs.

V. EMERGENCY RESPONSE PLAN

V.1. Actions to be taken before an outbreak

	Risk analysis and definition of risk level	Planning	Surveillance	Mitigation	Community engagement	Partnerships
What	<p>Key viral threats present in Cameroon, classification and hierarchy</p> <p>1. ACMV: High 2. EACMCV: High 3. EACMV: High 4. EACMV-UG): High</p> <p>Analysis carried out : Cassava leaves samples analyses (PCR and Elisa)</p>	<p>Key planning elements needed:</p> <ul style="list-style-type: none"> - Mapping the current distribution, incidence and severity - Train actors on symptoms recognition and sample collection and the use of mobile App - Build the capacity of laboratories in sample analysis - Put in place an emergency response team for centralizing, analyzing information and coordinating - Provide quick identification kits to inspectors, chiefs of base and brigades, chief of phytosanitary police post, Researchers 	<p>Mechanism of collecting and analyzing samples:</p> <p>All actors equipped with collecting Kit visit fields to collect samples and analyze on the spot or transfer to the lab</p> <p>Monitoring frequency: Data sheet with suspected samples should be sent to the response team every 60 days</p> <p>Early warning and monitoring system: Mobile phones will be used for early warning system</p>	<p>Communication strategy to build awareness:</p> <p>Develop effective communication material in several languages including locals (flyers, Pictures, posters, Video spots, cartoons, Radio spot, communities meeting)</p> <p>Responsible for coordinating awareness campaigns: Regional delegate at regional level; Emergency response team at the national level</p> <p>Strategy to ensure reduced economic and social impact: community involvement in all the action and timely intervention</p>	<p>Information needed for community members: Information on disease symptoms</p> <p>Raise community awareness using flyers, posters, pictures, Video spots, cartoons, Radio spot, Communities meeting</p> <p>Community actors involved in the management: Communities leaders, religious authorities</p> <p>Structuring of local community: Activities coordinated by community leaders</p> <p>Resources provided to local communities: transport, Incentives, communication...</p> <p>Communication channel and system: Information will be convey through the</p>	<p>Keys stakeholders and their roles:</p> <p>Administrative authorities: Put in place an emergency response team and follow up, provide diagnostic kits</p> <p>Research Institutions: Mapping the current distribution, incidence and Build the capacity of laboratories in sample analysis;</p> <p>Train actors on symptoms recognition and sample collection and the use of mobile App; Develop information sharing mechanism</p> <p>Farmers and local authorities:</p>

	Risk analysis and definition of risk level	Planning	Surveillance	Mitigation	Community engagement	Partnerships
		- Develop information sharing mechanism			established extension system (coordinated at the regional by the regional delegate)	mobilization at local level; Information sharing
Who	MINADER, Research Institutions, Emergency response team, NGOs	MINADER, Research Institutions, Emergency response team, NGOs	All actors involved in the cassava subsector	All actors involved in the cassava subsector	Communities leaders, religious authorities, farmer organizations	MINADER, Research Institutions, Emergency response team, NGOs, farmer organizations
How	Conduct phytosanitary risk analysis	Meetings	Field inspection and laboratory analyses	Develop effective communication material in several languages including locals, involvement of local communities	Community meetings with MINADER, Research Institutions, Emergency response team in attendance	Meetings, conventions, collaborative framework
When	2019-2020	2019	2019-2024	2019-2024	2019-2024	2019-2024

V.2. Actions to be taken in case of an outbreak

	Detection, Identification and Confirmation	Response, Containment, Quarantine and Elimination	Response system activation	Response system operation	Evaluation of the response to the outbreak
What	<p>Responsible for early detection: Farmers, extension agents, researchers</p> <p>Thread confirmed after laboratory analysis</p> <p>IRAD, MINADER and other research institutions determine the threat level</p> <p>The alert is given by the declaration from the Government</p> <p>Reporting Chain: Information is conveyed through the established extension system (coordinated at the regional by the regional delegate) from the field to the response committee</p> <p>Key entities alerted: MINADER regional delegates, Research Institutions, Emergency response team</p>	<p>MINADER is responsible for the Quarantine and containment</p> <p>Mechanism of quarantine and containment: It is described in law no 2003/003 of 21st April 2003 related to Phytosanitary protection. It include identifying infected properties, implementing quarantines, and conducting trace back and trace forward procedures for regulated pests and diseases</p> <p>Quarantine will last as long as the threat persist</p> <p>The threat is eliminated by official control methods (avoid new infection, control the vector, supplying clean and resistant planting material in the affected zones</p>	<p>MINADER and Emergency response team ensure the readiness of the surveillance system</p> <p>Responsible of the communication of the threat: Ministry of Communication through National radio and Television channels, national daily news</p>	<p>Engagement of key personnel and additional staff based on their competencies through call for tender</p> <p>Resources are deployed from the Ministry to the response committee which dispatch to stakeholders in the fields through the official accounting procedure</p> <p>Collected data include date of appearance, point of first observation incidence and severity, disease spread, number of people and ha farms affected, measure taken by local communities</p> <p>Mechanism of communication about the crisis. Press release, Awareness material (Flyers, posters, pictures, Video spots, cartoons, Radio spot, Communities meeting)</p>	<p>Effectiveness of the decisions: Decision taken are enforced by the administration to ensure it effectiveness</p> <p>Aspect of the crisis responses to be evaluated: Detection mechanism, Effectiveness of the surveillance mechanism during crisis, Involvement of different key stakeholders, infected fields case management</p>
Who	<p>Research institutions, Quarantines laboratories, extension agents, Farmers</p>	<p>MINADER, Research institutions, Quarantine labs, extension agents, Farmers</p>	<p>MINADER and Emergency response team</p>	<p>Research institutions, Quarantine laboratories, extension agents, Farmers</p>	<p>MINADER, research institutions, and Emergency response team</p>

How	Cassava leaves samples analyses (PCR, Elisa or kits)	Ministerial letters on quarantine measures to be taken	Official communiqué,	Field surveillance and interventions, samples collection and analysis, implementing control strategies, reporting	Evaluations of feedback by reports on effectiveness of procedures used for crisis management, field inspection
When	2019-2024	2019-2024	2019-2024	2019-2024	2019-2024

VI. OPERATIONAL STRATEGY

VI.1. Implementation Plan

VI.1.1. Sources of funding

Finance for the action plan is likely to come from a variety of sources:

- Government funding: The government is expected to be the primary financier since there is a limited engagement of private sector in cassava production.
- Donor support: Donors that have, and still continue to support projects related to pest and disease management including the Bill and Melinda Gates, Foundation World Bank, USAID Feed the Future, IFAD, European Commission, FAO... the list is not exhaustive
- Private sector support: Private sector actors can also be expected to support the plan, especially as it relates to commodity value chains that are well organized and generating substantial foreign export earnings.

VI.1.2. Implementation risk management

There are some potential threats that may affect some activities of this response plan:

- One key threat is that procedures of fund disbursement by the government are sometimes very slow. One way to avoid this is to involve decision-makers (inter-ministerial committee) in the project so that they better understand the nature of the problem.
- Another area of risk is related to the willingness of cassava farmers to be sufficiently motivated to implement the instructions and decisions being proposed by the project, for instance the destruction of plants or farms affected by CBSD. To remedy this risk, the project will compensate the farmers that their plants/farms will be destroyed.

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VI.2. Road Map

Strategic Objectives	Activities	Indicators/Milestones	2019		2020		2021		2022		2023	
			S1	S2								
No 1: Obtain government and stakeholder engagement for developing a concrete action plan against cassava viral threat	Meet with government authorities to seek their approval to develop a national response plan against cassava diseases	A national response plan against cassava diseases approved by the government of Cameroon										
	Organize a national workshops to develop the national response plan against cassava diseases	At least one national workshop held and the national response plan developed										
No. 2: Strengthen in-country capacity for improved cassava viruses surveillance for prevention, early detection, eradication and continued management of cassava viral threats	Organize annual exchange visits to other WAVE participating countries	5 exchange visits to other WAVE participating countries organized for human resources working for the programme										
	Recruit researchers, phytosanitary officers and seed inspectors, technicians/extension workers, quarantine and non-quarantine personnel and farmers to work on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control	7 Researchers, 10 extension workers/field technicians, 80 phytosanitary officers and 10 seed inspectors (from MINADER) recruited are available for training										
	build capacity researchers, phytosanitary officers and seed inspectors, technicians/extension workers, quarantine and non-quarantine personnel and farmers on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control	Four workshops organized and at least 7 Researchers, 10 extension workers/field technicians, 80 phytosanitary officers and 10 seed inspectors (from MINADER) trained on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control										
	Set up a national system for the collection, processing and management of data in order to develop early warning signals to mitigate CMD/CBSD outbreaks;	A national system for CMD/CBSD outbreaks set up for the collection, processing and management of data for an early warning signals to mitigate CMD and CBSB (A disease alert and early warning system developed)										
	Construct and equip laboratories for rapid detection and identification of CMDs	At least one national laboratory is built for rapid detection and identification of CMDs										
	Rehabilitate and equip laboratories of IRAD and that of MINADER for rapid detection and identification of CMDs	At least 6 phytosanitary laboratories IN different agro-ecologies and that of MINADER-Yaoundé rehabilitated for rapid detection and identification of CMDs										

Strategic Objectives	Activities	Indicators/Milestones	2019		2020		2021		2022		2023	
			S1	S2								
No. 2: Strengthen in-country capacity for improved cassava viruses surveillance for prevention, early detection, eradication and continued management of cassava viral threats	Build the capacity of laboratory technicians involved in project rapid on detection and identification of CMDs	100 lab technicians from regional laboratories trained on rapid detection and identification of CMDs			X	X	X	X	X	X		
	Equip both seed and phytosanitary inspectors with quick identification kits	at least 10 regional laboratories Regional laboratories equipped with at least 500 quick identification kits				X		X		X		
	Set-up meteorological stations/network to generate climatic data to predict and monitor whitefly migration	At least 3 meteorological stations Set-up in each of the 10 regions	X	X								
	Update the list of cassava pests and diseases in Cameroon to produce a quarantine pest and disease list	The list of cassava pests and diseases present in Cameroon updated annually;		X		X	X	X		X	X	
	Train stakeholders on integrated pest management systems of Cassava pests, diseases and vectors	At least 1500 researchers, phytosanitary and seed inspectors are trained on cassava IPM			X		X		X		X	
	Conduct an ex ante impact assessment of CBSD/CMD in Cameroon and other central African Counties where CBSD is present	an ex-ante impact assessment of CBSD/CMD in Cameroon and other central African Counties conducted	X	X								
	Evaluate the status of CMD/CBSD in Cameroon and update the map showing list of pathogens and their geographical distribution within the national territory		X	X	X	X	X					
No. 3: Raise awareness among cassava farmers and other stakeholders on the cassava viral threats	Produce and disseminate viral threat communication material	30,000 flyers produced and distributed across all the agro-ecologies of Cameroon			X	X						
	Organize radio and television sensitization campaigns to create awareness on the risk of CMD/CBSD	20 radio and television campaigns organised to create awareness on risk/mitigation strategies for CMD/CBSD in Cameroon	X	X	X	X	X	X	X	X	X	
	Organize community sensitization campaigns against CMD/CBSD with farmers and different stakeholders	At least 100 community sensitization campaigns against CMD/CBSD Organized with farmers and different stakeholders	X	X	X	X	X	X	X	X	X	
No. 4: Institute collaborative strategies to prevent and prepare for CBSD attack on Cassava in Cameroon Strategic	Establish effective collaborative framework for CBSD surveillance between IRAD and sectoral ministries (Agriculture, Transport, Scientific Research, etc.)	At least one inter-ministerial meeting held yearly and reports written		X	X	X	X	X	X	X	X	
	Develop regulations, guidelines and standard operation procedures about CBSD prevention and preparedness	Regulations, guidelines and standard operation procedures about CBSD prevention and preparedness developed	X	X								

Strategic Objectives	Activities	Indicators/Milestones	2019		2020		2021		2022		2023	
			S1	S2								
No. 5: Ensure production of healthy cassava planting materials	Breed or introduce, screen for virus resistant varieties	At least 4 new CBSD resistant cassava varieties evaluated and put at the disposal of farmers in cassava growing agro-ecologies of Cameroon	X	X	X	X	X	X	X	X	X	X
	Multiply and disseminate disease free planting material	At least 20 certified field established to multiply disease free planting material	X	X	X	X	X	X	X	X	X	X
	Build the capacity of researchers, phytosanitary and seed inspectors, farmers and extension workers on the production of healthy cassava planting material	At least 1500 researchers, phytosanitary and seed inspectors, farmers and extension workers trained on the production of healthy cassava planting material	X	X	X	X	X	X	X	X	X	X
	Train stakeholders on integrated pest management systems of Cassava pests, diseases and vectors	At least 1500 researchers, phytosanitary and seed inspectors, farmers and extension workers trained on integrated pest management systems of Cassava pests, diseases and vectors	X	X	X	X	X	X	X	X	X	X
No. 6: Coordinate, Monitor and Evaluate the implementation of the project in Cameroon	Coordinate implementation of activities in Cameroon	Project properly implemented and coordinated	X	X	X	X	X	X	X	X	X	X
	Acquire and allocate Materials and infrastructure for the implementation of the project	Project resources acquired following pre-established procedures	X	X	X	X	X	X	X	X	X	X
	Manage and ensure judicious use of human and financial resources allocated for project implementation	The use of project resources adequately supervised and coordinated	X	X	X	X	X	X	X	X	X	X
	Monitor and Evaluate the realization of the deliverables of the project	Project management and stakeholders provided with progress in the achievement of milestones monitored	X	X	X	X	X	X	X	X	X	X
	Organize stakeholder meetings and outreach programs	10 steering committee/task force meetings organized and reported	X	X	X	X	X	X	X	X	X	X
	Write and disseminate activity reports	10 semester and 5 annual reports written and shared with partners	X	X	X	X	X	X	X	X	X	X
	Recruit and fund activities on interns on specialized areas related to CMD and CBSD in Cameroon	25 reports of student interns written and available for exploitation	X	X	X	X	X	X	X	X	X	X
	Participate in international events organized by WAVE and other partners	7 international travels for EOC coordinators effected and mission reports written	X	X	X	X		X		X		X
	Organize the project lunch inauguration workshop	One project Inauguration workshop organized and stakeholders informed about the project	X									
	Evaluate the effectiveness of project implementation for accountability and policy formulation	One Midterm and a Final evaluations conducted										

VI.3. Monitoring and Evaluation Plan

Strategic Objectives	Indicators/Milestones	Monitoring indicators	Monitoring frequency	Responsibility for Monitoring	Audit source	Assumptions	Evaluation Frequency	Responsibility For evaluation
No. 1: Obtain government and stakeholder engagement for developing a concrete action plan against cassava viral threat	A national response plan against cassava diseases approved by the government of Cameroon	1 approved national cassava viral disease strategy paper	Semester 1, year 1	M&E Officer	National response plan approved by the MINRESI	The government of Cameroon will be willing to put in place a national cassava response strategy	/	/
	At least one national workshop held and the national response plan developed	1 national response project document written and submitted to MINRESI by IRAD	Quarter 1, year 1	M&E Officer	Workshop report at project coordination	Workshop is pre-finance by WAVE/IRAD		
No. 2: Strengthen in-country capacity for improved cassava viruses surveillance for prevention, early detection, eradication and continued management of cassava viral threats	5 exchange visits to other WAVE participating countries organized for human resources working for the programme	5 exchange visit reports	Semesters 3, 5, 7, 9 & 10	M&E Officer	EOC project coordination unit			
	7 Researchers, 10 extension workers/field technicians, 80 phytosanitary officers and 10 seed inspectors (from MINADER) recruited are available for training	Contracts with 7 researchers, one collaboration agreement with MINADER and staff put at disposal of project	Semester 2 & 3 years	M&E Officer	MINADER, EOC coordination and field	MINADER is will and able to put her staff at the disposal of the project		
	04 workshops organized and at least 07 researchers, 10 extension workers & field technicians, 80 phytosanitary officers and 10 seed inspectors (from MINADER) trained on rapid detection and identification of viral species/strains, threats, spread, quarantine and their control	4 workshop reports and 110 participants in attendance	Semesters 1 & 2 year 1	M&E Officer	EOC unit			

Strategic Objectives	Indicators/Milestones	Monitoring indicators	Monitoring frequency	Responsibility for monitoring	Audit source	Assumptions	Evaluation Frequency	Responsibility For evaluation
No. 2 (con't): Strengthen in-country capacity for improved cassava viruses surveillance for prevention, early detection, eradication and continued management of cassava viral threats	A national system for CMD/CBSD outbreaks set up for the collection, processing and management of data for an early warning signals to mitigate CMD and CBSD (A disease alert and early warning system developed)	A functional national CMD/CBSD outbreak information flow and response system	Semesters 2, 4, 6, 8 and 10		Reports at EOC coordination and Regional officers. Recruited field workers at all levels	The national response system will be put in place and all the actors will be doing their job	Semester 3 & 6	International Consultant from WAVE countries
	At least one national laboratory is built for rapid detection and identification of CMDs	01 laboratory constructed	Semester 3		At site chosen by project management	The government will to allocate a site and authorization for the construction work		
	At least 6 phytosanitary laboratories in different agro-ecologies and that of MINADER-Yaoundé rehabilitated for rapid detection and identification of CMDs	7 rehabilitated laboratories	Semester 3		Different labs	Local purchase and importation procedures for Materials and equipment will be favourable		
	100 lab technicians from regional laboratories trained on rapid detection and identification of CMDs	5 workshop reports and attendance list showing at least 100 trained Lab technicians	Semesters 4-9		EOC coordination unit			
	at least 10 regional laboratories Regional laboratories equipped with at least 500 quick identification kits	500 kits in 10 regional laboratories	Semester 5, 7 and 9		Regional labs and delivery/receipt	The kits will be available in the international market		
	At least 3 meteorological stations Set-up in each of the 10 regions	30 meteorological stations set up across the 10 regions of Cameroon	Semesters 3		5 regional EOC offices in the 5 agro-ecologies of Cameroon	The equipment are available in the international market and that the custom procedures in Cameroon would not be a handicap		
	The list of cassava pests and diseases present in Cameroon updated annually	Annual reports showing list of pest and diseases	Semesters 3, 5, 7 and 10		EOC coordination Office	New cassava viruses will be identified in Cameroon		

Strategic Objectives	Indicators/Milestones	Monitoring indicators	Monitoring frequency	Responsibility for monitoring	Audit source	Assumptions	Evaluation Frequency	Responsibility For evaluation
No. 2 (con't): Strengthen in-country management of cassava viral threats	At least 1500 researchers, phytosanitary and seed inspectors are trained on cassava IPM	4 workshop training reports including list of at least 1500 participants	Semesters 4, 6, 7 & 10		EOC coordination Office			
	an ex-ante impact assessment of CBSD/CMD in Cameroon and other central African Counties conducted	One ex ante impact assessment report	Semester 3	Agro-economist of IRAD	Production System coordination of IRAD	Collaborators will be identified in other WAVE countries for cross-country impact assessment		
No. 3: Raise awareness among cassava farmers and other stakeholders on the cassava viral threats	30,000 flyers produced and distributed across all the agro-ecologies of Cameroon	Stock of flyers produced and receipt	Semester 3 & 4		EOC coordination unit			
	20 radio and television campaigns organised to create awareness on the risk/mitigation strategies for CMD/CBSD in Cameroon	Radio and Television interventions	Semesters 2, 4, 6,8 & 10		Radio and Television programmes and written supporting documents	The radio & TV will accept to publish written materials		
	At least 100 community sensitization campaigns against CMD/CBSD Organized with farmers and different stakeholders	100 community sensitization reports	Semesters 2, 4, 6,8 & 10		Sensitization reports and field visits			
No 4: Put in place collaborative strategies to prevent and prepare for CBSD attack on Cassava in Cameroon Strategic	At least one inter-ministerial meeting held yearly and reports written	One written Inter-ministerial meeting report	Semesters 2, 4, 6,8 & 10		Meeting reports at EOC coordination unit	Ministerial departments will be willing to collaborate		
	Regulations, guidelines and standard operation procedures about CBSD prevention and preparedness developed	Policy on CBSD signed and promulgated by government	Semesters 3		Decision on CBSD prevention in Cameroon	The government will accept to promulgate new policy on CBSD prevention.		

Strategic Objectives	Indicators/Milestones	Monitoring indicators	Monitoring frequency	Responsibility for monitoring	Audit source	Assumptions	Evaluation Frequency	Responsibility For evaluation
No 5: To ensure the production of healthy cassava planting material	At least 4 new CBSD resistant cassava varieties evaluated and put at the disposal of farmers in cassava growing agro-ecologies of Cameroon	4 new varieties introduced to farmers in cassava growing ecologies of Cameroon	Semesters 2, 4, 6,8 & 10		Evaluation reports and Field trials	CBSD cassava resistant varieties would be accessed from research institution such as IRAD, IITA, etc.		
	At least 20 certified field established to multiply disease free planting material	20 certified field established in all the agro-ecological zones	Semesters 2, 4, 6,8 & 10		Distribution/ receipt duly signed by recipient farmers	Adapted varieties would be identified for the different agro-ecological zones		
	At least 1500 researchers, phytosanitary and seed inspectors, farmers and extension workers trained on the production of healthy cassava planting material	10 training workshops for 1500 stakeholders	Semesters 2, 4, 6,8 & 10		Workshop report and attendance list	Resources will be available to organize organized workshops each year		
	At least 1500 researchers, phytosanitary and seed inspectors, farmers and extension workers trained on integrated pest management systems of Cassava pests, diseases and vectors	10 training workshops for 1500 stakeholders	Semesters 2, 4, 6,8 & 10		Workshop report and attendance list	Resources will be available to organize organized workshops each year		
No 6: Coordinate, Monitor and Evaluate the implementation of the project in Cameroon	Project implementation properly coordinated by the project coordinator	Respect of professional deontology						
	Project resources acquired following pre-established procedures	Transparency and accountability report	Twice a year		M&E office	Project Procurement procedures adopted and will be followed scrupulously		
	The use of project resources adequately supervised and coordinated	Transparency and accountability report	Twice a year		M&E office	Project Procurement procedures adopted and will be followed scrupulously		

Strategic Objectives	Indicators/Milestones	Monitoring indicators	Monitoring frequency	Responsibility for monitoring	Audit source	Assumptions	Evaluation Frequency	Responsibility For evaluation
No 6 (con't) : Coordinate, Monitor and Evaluate the implementation of the project in Cameroon	Project management and stakeholders provided with the progress in the achievement of milestones monitored	Semester Monitoring and Evaluation reports	Twice a year		EOC coordination and M&E			
	10 steering committee /task force meetings organized and reports written	10 steering committee meeting reports	Twice a year		EOC coordination			
	10 semester and 5 annual reports written and shared with partners	15 reports written and available for exploitation	Semesters 2, 4, 6,8 & 10		EOC coordination and decentralized units	Respective agro-ecological leaders will forward reports to the national coordination		
	25 reports of student interns written and available for exploitation	25 internship reports written by university students	Semesters 2, 4, 6,8 & 10		EOC coordination units and universities	Universities will be running normally and that students will be will to undertake internships with the project.		
	7 international travels for EOC coordinators effected and mission reports written	7 mission reports	Semesters 2,3,4,5,7,9& 10		Mission report at EOC coordination unit	Other WAVE countries and partners would organize international events that are of interest to the Project		
	One project Inauguration workshop organized and stakeholders informed about the project	One workshop report	Semester 1		Evaluation reports at EOC unit			
	One Midterm and a Final evaluations conducted	01 midterm & 01 final evaluation reports	Semester 5 & 10		Evaluation reports at EOC unit		Midterm and final year	External Evaluator in collaboration with M&E

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