

**MINISTRY OF
AGRICULTURE AND
WATER DEVELOPMENT**



BURKINA FASO

UNITY – PROGRESS – JUSTICE

NATIONAL CASSAVA VIRAL DISEASES ACTION PLAN FOR BURKINA FASO

**PROGRAMME OUEST AFRICAIN D'EPIDEMIOLOGIE VIRALE POUR LA SECURITE
ALIMENTAIRE**

(WEST AFRICAN VIRUS EPIDEMIOLOGY FOR FOOD SECURITY « WAVE »)

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parentheses, replace French quotation marks with
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DECEMBRE 2018

TABLE OF CONTENTS

FOREWORD BY THE MINISTER OF AGRICULTURE	I-3
EXECUTIVE SUMMARY	I-4
I. CONTEXT.....	I-5
Current National Situation in Relation to Cassava Viral Threats	I-5
Mapping of Major Stakeholders	I-6
Risk Assessment	I-7
Current Outbreak Management Process	I-8
Gap Assessment	I-9
II. STRATEGIC OBJECTIVES AND NATIONAL ACTION PLAN VISION.....	II-11
Vision.....	II-11
Strategic Objectives	II-11
III. STRUCTURE OF EMERGENCY OPERATIONS CENTER (EOC)	III-13
Institutional Anchoring.....	III-13
Governance	III-13
Organizational Structure	III-13
Human Resources	III-14
Financial and Material Resources	III-16
Partnerships	III-16
IV. EMERGENCY ACTION PLAN.....	IV-18
Actions to be Taken before an Outbreak.....	IV-18
Actions in the Event of an Outbreak	IV-20
Phytosanitary Measures	IV-22
V. OPERATIONAL STRATEGY	V-23
Strategy Implementation Plan	V-23
Monitoring and Evaluation Plan	V-26

LIST OF ABBREVIATIONS

- ACMV:** African cassava mosaic virus
- AGRODIA:** Agro-Input Wholesalers and Retailers of Burkina Faso
- ARFA:** Association de Recherche et de Formation Agroécologique [Agro-Ecology Research and Training Association]
- Caritas:** Organisation Catholique pour le Développement et la Solidarité [OCADES]
- CBSV:** Cassava Brown Streak Virus
- CEAS:** Centre Ecologique Albert Schweitzer [Albert Schweitzer Ecology Center]
- CNRST:** Centre National de la Recherche Scientifique et Technologique [National Center for Scientific and Technological Research]
- COCIMA:** Coopérative de Commercialisation des Intrants et Matériels Agricoles [Cooperative for Marketing Agricultural Inputs and Materials]
- CPF:** Confédération Paysanne du Faso [Faso Farming Federation]
- CRA:** Chambre Régionale d'Agriculture [Regional Chamber of Agriculture]
- CVD:** Comité Villageois de Développement [Villages Development Committee]
- DDPA:** Direction du Développement des Productions Agricoles [Directorate for Agricultural Production Development]
- DGESS:** Direction Générale des Etudes et des Statistiques Sectorielles [Directorate General for Sector Studies and Statistics]
- DGPER:** Direction Générale de la Promotion de l'Economie Rurale [Directorate General for the Promotion of the Rural Economy]
- DGPV:** Direction Générale des Productions Végétales [Directorate General for Plant Production]
- DIMA:** Direction Générale des Etudes et des Statistiques Sectorielles [Directorate for Agricultural Inputs and Mechanization]
- DPVC:** Direction de la Protection des Végétaux et du Conditionnement [Directorate for Plant Protection and Packaging]
- DRAAH:** Direction Régionale de Agriculture et des Aménagements Hydrauliques [Regional Directorate for Agriculture and Water Development]
- DRREA:** Direction Régionale de la Recherche Environnementale et Agricole [Regional Directorate for Environmental and Agricultural Research]
- DTA:** Direction de la Technologie Alimentaire [Food Technology Directorate]
- EACMV:** East African cassava mosaic virus (Cameroon)
- EACMV-UG:** East African cassava mosaic virus-Uganda variant
- EOA:** Ecological Organic Agriculture
- FAARF:** Fonds d'Appui aux Activités Rémunératrices des Femmes [Fund to Support Women's Income-Generating Activities]
- FAO:** Food and Agriculture Organization of the United Nations
- FIAB:** Fédération des Industries Agroalimentaires du Burkina [Burkina Agrifood Industries Federation]
- GDP:** Gross Domestic Product
- GTPA/Wendkuni:** Fonds d'Appui aux Activités Rémunératrices des Femmes [Wendkuni Agricultural Product Producers' Group]
- IITA:** Institut International d'Agriculture Tropicale [International Center for Tropical Agriculture]
- INERA:** Institut de l'Environnement et de Recherches Agricoles [Institute for the Environment and Agricultural Research]
- IRSAT:** Institut de Recherche en Sciences Appliquées et Technologies [Technology and Applied Sciences Research Institute]
- IVC:** In vitro culture

MAAH: Ministère de l’Agriculture et des Aménagements Hydrauliques [Ministry of Agriculture and Water Development]

MASA: Ministère de l’Agriculture et de la Sécurité Alimentaire [Ministry of Agriculture and Food Security]

MESRSI: Ministère de l’Enseignement Supérieur, de la Recherche Scientifique et de l’Innovation [Ministry of Higher Education, Scientific Research and Innovation]

NAFASO: Neema Agricole du FASO, a Burkina Faso-based seed company

NGO: Non-Governmental Organization

NTC: National Technical Committee

PAPSA: Projet d’Amélioration de la Productivité Agricole et de Sécurité Alimentaire [Agricultural Productivity and Food Security Improvement Project]

PCR: Polymerase Chain Reaction

PDA/GIZ: Agriculture Development Program/German Agency for International Cooperation

PIPA: Programme d’Intensification de la Production Agricole [Agricultural Production Intensification Program]

PNDES: Programme National de Développement Economique et Social [National Program for Economic and Social Development]

RCA: Rolling Circle Amplification

RCPB: Réseau des Caisses Populaires du Burkina [Burkina Credit Union Network]

RG: Recensement Général de l’Agriculture [General Agricultural Census]

SAPHYTO: Société Africaine de Produits Phytosanitaires et d’Insecticides [African Plant Health and Insecticide Product Company]

UAT: Technical Leadership Unit

UCBSV: Ugandan Cassava Brown Streak Virus

UNPSB: Union Nationale des Producteurs Semenciers du Burkina [Burkina National Union of Seed Producers]

ZAT: Zone Appui Technique [Technical Support Zone]

List of figures

Figure 1: Organizational chart of the NTC III-14

List of tables

Table 1: Key stakeholders in the cassava value chain I-6

Table 2: Other key stakeholders I-7

Table 3: Current evaluation of risks to cassava in Burkina Faso I-7

Table 4: Current actions to manage threats to cassava in Burkina Faso I-8

Table 5: 5-year Budget III-16

Table 6: Actions to be taken before an outbreak IV-18

Table 7: Actions in the event of an outbreak IV-20

Table 8: Activity timeline V-23

Table 9: Monitoring and evaluation plan table V-26

FOREWORD BY THE MINISTER OF AGRICULTURE

Burkina Faso has placed diversification of agricultural production at the heart of its farming development strategy. My department has made subsidized cuttings available to producers, in order to intensify cassava production. Along with this work, multi-stakeholder platforms have been established in the main producing regions.

In 2018, my department drew up a national strategy for promotion of the cassava sector. This strategy will put cassava on the same level as grain crops, and will give it the attention it merits.

This sends the message that we see the benefits of this crop, and we are very aware of the range of concerns about and threats to cassava.

In Burkina Faso, viral diseases, particularly African cassava mosaic virus, are present, and have a negative impact on cassava production. There is also a major threat from cassava brown streak virus disease. This disease is spreading toward West Africa, and we must be proactive if we do not want to see our efforts come to nothing.

This prevention and response plan was created by the Ministry of Higher Education and Scientific Research and by my department, with the aim of preparing to confront these threats, primarily using preventative measures.

This emergency prevention and intervention plan will look at cassava specifically, and will equip our plant protection services to deal with viral threats.

I am placing great emphasis on the following principles, which guided the creation of this plan:

- Cooperation and partnership: this plan is part of a synergistic approach, and one that reinforces the ability of our surveillance systems to deal with threats to plant production. A culture of joint working and information sharing between the Ministry of Agriculture's plant protection services and the institute for the environment and agricultural research (INERA) must be developed; this will be essential when dealing with the current threats to cassava production
- Capacity building: the emergency operations center (EOC) will identify requirements for capacity building and infrastructure and skills strengthening throughout the cassava viral diseases prevention and response system
- This prevention and response plan will be part of the general program developed as part of the project investigating the epidemiology of root and tuber viral diseases in West and Central Africa, with a view to blocking the spread of cassava brown streak virus into West Africa. It is a joint project by Benin, Côte d'Ivoire, Ghana, Nigeria, Togo and the Democratic Republic of the Congo
- It will build a visionary prevention and response system that incorporates recent cutting-edge virology research and innovative solutions that put science at the heart of agricultural development

I greatly value the implementation of the plan, and I would like to see all stakeholders lend their commitment and support to its success.

Signature

Minister of Agriculture and Water Development

EXECUTIVE SUMMARY

Cassava is a crop that is growing in popularity in Africa and worldwide. In Burkina Faso, despite the prevalence of grain crops, cassava production is gaining ground and is at the heart of agricultural policies for nutrition and food security.

However, viral diseases, particularly African cassava mosaic virus, do exist in this country. These viruses cause crop losses of up to 90%. Over recent years, a virus known as cassava brown streak virus has emerged in East Africa. It is spreading toward West Africa, and is currently present in the Democratic Republic of the Congo (DRC). Crop loss caused by this virus can be up to 100%.

This cassava viral diseases prevention and response plan has been developed with the aim of reducing the impact of viral diseases on cassava production in Burkina Faso, and of blocking the spread of cassava brown streak virus.

It was developed jointly by the Ministry for Higher Education, Scientific Research and Innovation (MESRSI), which has the technical capacity to diagnose and monitor these diseases, and the Ministry for Agriculture and Water Development (MAAH), which is charged with acting nationally when outbreaks occur.

This plan will be coordinated by a national technical committee (NTC), which will be chaired by the secretary general of MAAH. The various stakeholders and human resources come from both ministries, and each stakeholder will work in their area of competence and in line with the national terms of reference.

By 2023, this plan will provide a powerful framework for cassava viral threats prevention and response, which will improve food security in Burkina Faso. This plan contains 5 strategic objectives:

- Establish a functional cassava viral diseases surveillance system
- Create an early warning and response system to combat cassava viral threats
- Operationalize the system for cassava seed control, certification and quarantine
- Build the technical and material capacity of prevention, surveillance and response stakeholders
- Develop and implement a communications strategy to support prevention and response actions

The plan contains provision for an emergency operations center, which will be organized in accordance with existing structures in MAAH in the event of an outbreak. It will also contain an emergency action plan, containing the steps to be taken before an outbreak, and what to do when an outbreak occurs. In operational terms, an implementation plan for this strategy has been created, with a clear route map and a monitoring and evaluation component.

I. CONTEXT

Current National Situation in Relation to Cassava Viral Threats

Economic and Social Importance

In Burkina Faso, agriculture is the main source of income for the poorest populations, and is the main element of food security. More than 80% of the working age population is involved in agriculture, and it contributes around 31% to GDP (PNDES, 2016). The main crops are grains (sorghum, millet, maize).

Cassava production was marginal for a long time. Cassava is mainly grown in the western region of Burkina Faso, and mainly in kitchen gardens and the lowlands. Annual production is estimated at over 22,000 metric tons, although production peaks have been recorded. This crop is concentrated in the western and south-western regions of the country (MASA, 2013). Average yield for the period 2006-2010 was 17 metric tons/hectare (MASA, 2010). These yields are much lower than what could potentially be achieved, even though they were obtained in semi-controlled conditions.

Over recent years, the ministry of agriculture has made subsidized cuttings available to producers, in order to intensify cassava production nationally. These efforts to support the cassava sector have been supported by the creation of multi-stakeholder platforms in the main producing regions and involvement of development partners. In 2018, the ministry of agriculture drew up a national strategy for promotion of the cassava sector. This strategy will put cassava on the same level as grain crops, and will give it the attention it merits. Aside from these initiatives, cassava has become a priority crop and has been the subject of agronomy research. Cassava production in Burkina Faso has been steadily increasing since 1995, thanks to strategic plan 1 of the policy on diversification of key sectors, which has been adopted by the authorities, with support from FAO and IITA (DIANCOUMBA, 2008).

Burkina Faso is now a center for cassava production, and the crop is prized by the population. Cassava growing is increasing. Currently, over 3.7% of farming households produce cassava over the course of the year. According to the RGA (2009), 14.5% of households in the Cascades, Hauts-Bassins and Sud-Ouest regions produce cassava during the rainy season. In the dry season, the Cascades region is the biggest producer, with 1.5% of farming households producing cassava, compared with 0.9% in other regions.

Gari, attiéké and cassava paste are the main products derived from cassava tubers. The tuberous roots of cassava are most frequently consumed and marketed in two forms: attiéké and cassava paste (placcali, a word from Côte d'Ivoire dialect). The leaves are a significant source of protein, which partially compensate for the low-protein nature of diets that are mainly based on tubers. A shortfall in national attiéké production leads to the importation of 11,200 metric tons of cassava paste from Côte d'Ivoire, Togo and Ghana (MASA, 2013). These imports represent a huge outflow of currency, estimated at between 8 and 12 billion CFA francs.

Production, processing and marketing of cassava and its derivatives involve all sections of the population, particularly women. Cassava-producing women have organized themselves into groups or associations, based around processing facilities.

With the growing popularity of cassava, producers are themselves introducing cassava varieties from neighboring countries, i.e. Côte d'Ivoire, Ghana, Togo and Benin. This exposes our country to significant risks, given that cassava viral diseases are present in the region, and these practices may negate the considerable efforts made to promote this sector.

Summary of Current Situation

1. Threats: - Diseases and pests
 - Uncontrolled introduction of plant material
 - Phytosanitary quality of plant material
 - Distribution method
 - Lack of functional seed system
 - The way the plant grows allows viral diseases to accumulate
2. Varieties from IITA that are resistant to African cassava mosaic virus FAO/IITA
 - PDA/GIZ cassava promotion / NGO
 - PAPSA with platforms
 - PIPA program: agricultural production intensification program/DGPV - making available cuttings, including cassava cuttings, at subsidized prices
 - Validation of action plan for the cassava sector in process
 - ASUDECO NGO distributing cassava cuttings in the Sud-Ouest region
3. Creation of a functional cassava seed system
 - Cleaning system using in vitro culture
 - Constant surveillance, because of the openness of the borders
 - Making quarantine measures functional, by analyzing phytosanitary risk
 - Build capacity among surveillance officers and phytosanitary surveillance units

Mapping of Major Stakeholders

Along the Cassava Value Chain

Table 1: Key stakeholders in the cassava value chain

	Research	Inputs	Production	Storage and Transport	Transformation	Marketing and Promotion
Public	<ul style="list-style-type: none"> - MESRSI - INERA - IRSAT 	<ul style="list-style-type: none"> - Cuttings and Pesticide (MAAH/DGPV) - MESRSI (INERA) 	<ul style="list-style-type: none"> MAAH (DGPV; DRAAH) MESRSI (INERA) 	N/A	<ul style="list-style-type: none"> MAAH - DGPER MESRSI - IRSAT/DTA NGO/project 	<ul style="list-style-type: none"> - Business center - FAARF

Private	<ul style="list-style-type: none"> - Fertilizer and pesticides (AGRODIA, COCIMA, SAPHYTO) - Cuttings - NAFASO - EOA - Other (private propagators) 	<ul style="list-style-type: none"> - Cassava producers 	<ul style="list-style-type: none"> - Transportation: road and rail - Storage: retailers, producers, processors 	<ul style="list-style-type: none"> - GTPA-Wendkuni - Processing units - Faso Pate Manioc [Faso Cassava Paste] - Agro Eco Business 	<ul style="list-style-type: none"> - FIAB - RCPB

Other Key Stakeholders

Table 2: Other key stakeholders

Government	Private Sector	Civil Society Organizations/NGOs	Bi- and Multilateral Partners	Others
<ul style="list-style-type: none"> - Ministry of Trade 	N/A	<ul style="list-style-type: none"> - NGO/project - ASSUDEC - ARFA - Caritas - CEAS 	<ul style="list-style-type: none"> - FAO - PDA/GIZ 	<ul style="list-style-type: none"> - Regional Agriculture Chambers (CRA) - Faso Farming Federation (CPF)

Risk Assessment

Table 3: Current evaluation of risks to cassava in Burkina Faso

Main Threats	Level of risk (Low / Moderate / High)	Current Consequences for Crops	Probability of Outbreak (Low / Moderate / High)	Further Consequences If Nothing is Done
Fungal threats				
<i>Cladosporium sp</i> <i>Fusarium solani</i> <i>Phoma sp</i>	Moderate	Sporadic destruction of production plots in Kéné Dougou Province	Moderate	
Bacterial threats				
<i>Xanthomonas axonopodis pv. manihotis</i>	Low	Not highly visible	Low	

Viral threats				
African cassava mosaic virus (ACMV)	High	All local varieties are infected	High	Has a negative effect on cassava production
East African cassava mosaic Cameroon virus (EACMCV)	High	All local varieties are infected	High	Has a negative effect on cassava production
East African cassava mosaic virus-Uganda (EACMV-UG)	High	This virus was reported in 2009 in a market garden in Koubri, near Ouagadougou	High	Has a negative effect on cassava production

Current Outbreak Management Process

Action Currently Taken (*)

Table 4: Current actions to manage threats to cassava in Burkina Faso

Risk type	Prevention, mitigation and strategic planning	Detection and intervention	Monitoring and evaluation
<i>Cladosporium sp</i> <i>Fusarium solani</i> <i>Phoma sp</i>	<ul style="list-style-type: none"> - Use of healthy cuttings - Good growing practices - Control of plant material at borders (checkpoints) - Surveillance of the disease in the field 	<ul style="list-style-type: none"> - Surveillance of fields by agricultural workers - Taking specimens - Laboratory tests for detection in INERA research stations 	<ul style="list-style-type: none"> - Characterization of the pathogen - Evaluation of incidence in the collection region - Information and Support - advice to technical workers and producers
<i>Xanthomonas axonopodis</i> <i>pv. manihotis</i>	<ul style="list-style-type: none"> - Use of healthy cuttings - Good growing practices - Control of plant material at borders (checkpoints) - Surveillance of the disease in the field 	<ul style="list-style-type: none"> - Surveillance of fields by agricultural workers - Taking specimens - Laboratory tests for detection in INERA research stations 	<ul style="list-style-type: none"> - Characterization of the pathogen - Evaluation of incidence in the collection region - Information and Support - advice to technical workers and producers
Viral diseases: <ul style="list-style-type: none"> - ACMV - EACMCV 	<ul style="list-style-type: none"> - Surveillance of the disease in the field 	<ul style="list-style-type: none"> - Detection will be done by surveillance of fields by agricultural workers - Laboratory tests at the virology laboratory, INERA 	<ul style="list-style-type: none"> - Characterization of the pathogen - Evaluation of incidence in the collection region - Information and Support - advice to

			technical workers and producers
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(*) For each of the threats classified as high or moderate above

Gap Assessment

Strengths

- The growing interest from producers in cassava as a food source, particularly in the hungry season, and as an income source; growing area is increasing every year
- Emergence of leading producers in this sector
- Increase in the number of processing units
- High levels of demand from processing units for raw material
- High levels of demand for attiéké and other derivative products (gari, flour, tapioca, starch etc.)
- The emergence of producers' organizations is a sign of the interest producers have in this crop
- There are multi-stakeholder innovation platforms in the major production areas
- Support for the sector from public bodies, projects, NGOs (distribution of cuttings for production, support for processing)
- A modern seed sector is emerging
- Phytosanitary diagnosis of viral diseases
- Mapping of viral diseases nationally
- Building stakeholder capacity
- Availability of farmland
- Presence of local cassava processing equipment suppliers
- Creation of stable jobs for young people and women.

Weaknesses

The weaknesses of the cassava sector are as follows (by area):

Production

- Lack of technical supervision in the regions that do not have cassava production programs or projects
- The seed sector is informal
- High levels of viral disease prevalence, particularly in local cultivars
- Poor knowledge of diseases and pests among field workers and producers
- Production stakeholders have low levels of technical and organizational capacity
- Low level of varietal diversification to combat constraints on production and processing
- Low overall level of production
- No specific fertilizers for cassava production on the market
- No promotion of varieties that are rich in beta carotenes

Processing

- Lack of knowledge about the suitability of improved varieties for specific uses (sweet cassava, attiéké, gari, etc.)
- Shortage of raw materials causing shutdown of production units

- Lack of skill in processing techniques
- High cost of processing equipment
- No production units for pressed cassava paste in major production areas, which would supply local units in and away from urban centers
- High cost of transporting cassava from where it is produced to the processing site.

Marketing

- Poor connection between production and market
- Poor hygiene in transportation of paste and attiéké imported from neighboring countries.

Key takeaways

In terms of strengths and weaknesses, the main takeaways are as follows:

- With increased production, the emergence of processing units, and the role cassava plays in food and nutritional security and in poverty reduction, the cassava sector deserves more attention from politicians
- The current cutting distribution system does not guarantee production quality, and therefore requires formal organization along similar lines to grains and pulses
- On the ground, farm workers and producers have difficulty in recognizing cassava diseases, and need further technical capacity
- Phytosanitary inspections of seeds crossing borders are not carried out frequently enough, and there is a need for increased awareness and capacity
- Phytosanitary surveillance within the country is done in research facilities, and should be incorporated into a permanent, functional system
- For some diseases, including cassava viral diseases, disease control measures must be mandatory
- Better structuring of organizations in the sector would lead to greater dynamism along the value chain.

II. STRATEGIC OBJECTIVES AND NATIONAL ACTION PLAN

VISION

Vision

The vision enshrined in the action plan is the following: “By 2023, this prevention and response plan for cassava viral threats will be fully operational and will have improved food security”.

Strategic Objectives

Strategic Objective 1.: Establish a Functional Cassava Viral Diseases Surveillance System

Outcome 1: Two national workshops organized to inform and coordinate the various stakeholders in the cassava value chain

1. Organize a national information workshop
2. Organize a national workshop for dialog with stakeholders in the cassava value chain

Outcome 2: NTC regulatory texts written and the various implementation committees are set up

3. Write the NTC’s regulatory texts
4. Set up National Technical Committee
5. Set up regional surveillance committees

Strategic Objective 2.: Create an Early Warning and Response System to Combat Cassava Viral Threats

Outcome 1: Cassava production zones are mapped, and the extent to which cuttings move across borders is determined

1. Map production zones
2. Continue mapping of viral threats
3. Evaluate the extent to which cassava cuttings move within the country and across borders

Outcome 2: Operational surveillance in cassava production zones

4. Collect and characterize the national cassava germplasm
5. Operationalize surveillance in cassava production zones

Strategic Objective 3.: Operationalize the System for Cassava Seed Control, Certification and Quarantine

Outcome 1: Production and distribution of cassava seed are regulated, and the quarantine system for infected cuttings is operational

1. Create production standards for healthy seed for cassava cuttings
2. Create an inspection protocol for cassava cuttings
3. Operationalize the unit that will clean and conserve the cassava germplasm in vitro
4. Operationalize the quarantine system

5. Create a georeferenced directory of cassava seed producers
6. Organize inspections of seed plots by the NTC

Strategic Objective 4.: Build the Technical and Material Capacity of Prevention, Surveillance and Response Stakeholders

Outcome 1: All key staff in the NTC are trained, as are key stakeholders in the cassava value chain

1. Train members of surveillance units
2. Train seed inspectors
3. Train seed producers
4. Train phytosanitary inspectors and auditors
5. Train agricultural extension agents
6. Train cassava producers
7. Training for technicians and researchers

Outcome 2: The equipment required for phytosanitary response and control is procured and operational

8. Procure additional equipment to help the in vitro culture laboratory to function
9. Procure equipment and materials for phytosanitary checks on the ground
10. Procure additional equipment to help the virology laboratory to function
11. Procure greenhouses, one of which should have security level 2, for quarantine services

Strategic Objective 5.: Develop and Implement a Communications Strategy to Support Prevention and Response Actions

Outcome 1: Cassava viral threats are well known by all stakeholders, and there is national awareness

1. Create a communications strategy
2. Produce radio/TV programs
3. Produce documentary films
4. Create posters, technical specifications, leaflets, etc.

III. STRUCTURE OF EMERGENCY OPERATIONS CENTER (EOC)

Institutional Anchoring

Ministry of Agriculture and Water Development (MAAH) The National Technical Committee (NTC) is contained within the MAAH, under the supervision of the ministry's Secretariat General.

Three plans are already being coordinated by the MAAH:

- Plan for response to large-scale invasion of fall armyworm in Burkina Faso
- National emergency locust plan
- Plan for response to large-scale invasion of granivorous birds in Burkina Faso

Governance

Mandate

- To coordinate implementation of the Plan via programming, training, monitoring and evaluation
- To create and apply strategies and programs for prevention, monitoring and response
- To monitor and evaluate monitoring and response operations
- To communicate in support of prevention and response actions

Organizational Oversight

Organizational oversight will be provided by a **steering committee**, headed by the minister from MAAH. WAVE and other key organizations in the cassava value chain will be part of this steering committee. This committee will be set up when the CNT is established.

Organizational Structure

Governing Departments and Authorities

The governing organs are:

- Steering committee
- National Technical Committee (NTC)
- Regional surveillance units

The departments involved are:

Nationally:

- Secretary General of MAAH/DGESS, DGPV, DGPER
- Delegate General of CNRST/MESRSI/INERA
- National Chamber of Agriculture
- Technical and Financial Partners (TFP)

Regionally:

- Governors
- DRAAH, DRREA, CRA
- Projects and NGOs

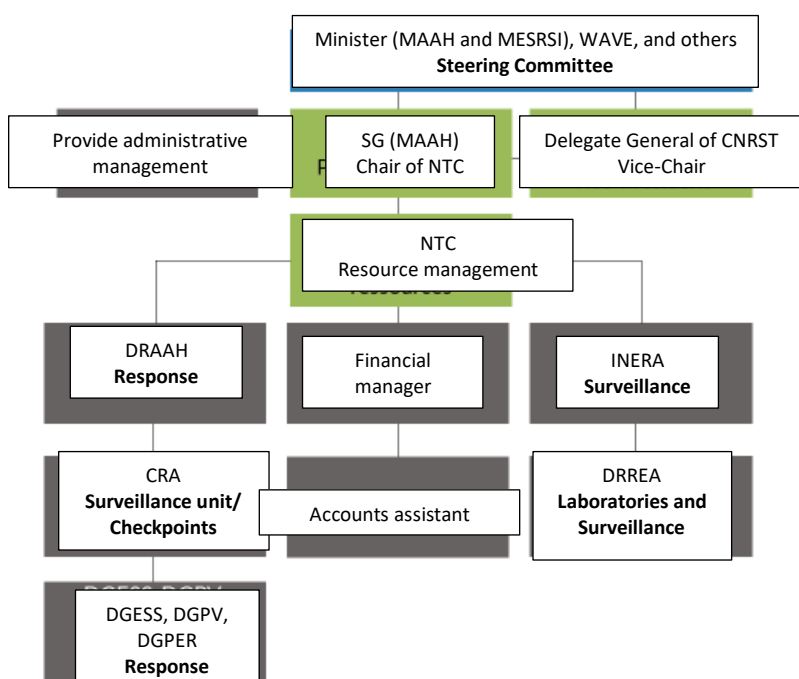
Hierarchical and Decision-making Structure

The hierarchical and decision-making structure is as follows:

- The steering committee sets out the NTC's major strategic priorities. This committee does not play a part in the NTC's operations, but oversees its work
- The National Technical Committee (NTC) consolidates and analyses information before making decisions. The most important decisions are referred up to the Minister from MAAH, who chairs the steering committee
- Regional surveillance committees report observations from the field to the NTC, using reports and other communication methods
- Phytosanitary surveillance units and border checkpoints report observations from the field to the regional committees.

Organization Chart

Figure 1: Organizational Chart of the NTC



Human Resources

Core Competencies

The General Secretariat of the MAAH and MESRSI/CNRST will provide the key competencies required for management of the NTC.

INERA will provide the following competencies:

- Breeders of cassava and sweet potato
- Phytopathologists (bacteriologist, mycologist, virologist)
- Entomologist
- In vitro culture specialists

The DGPV (DDP, DPVC, DIMA) will provide the following competencies:

- Seed inspectors

- Phytosanitary inspectors
- Root and tuber specialist.

The DRAAH will provide the following competencies:

- Phytosanitary checkers
- Plant protection officers
- Heads of Technical Support Zone (ZAT)
- Heads of Technical Leadership Unit (UAT)

Financial management will be provided by the following people, who will be hired by the EOC:

- Financial management
- Accounts assistant

Roles and Responsibilities

The General Secretariat of the MAAH and MESRSI/CNRST will guarantee institutional protection of the EOC.

INERA (plant breeder, phytopathologists, IVC specialist) performs the following functions:

- Identification and characterization of diseases
- Assessment of the extent of outbreaks
- Production of disease-free planting material
- Cleaning of affected varieties
- Capacity building (MAAH workers, seed inspectors, seed producers)
- Supervised implementation of prevention and response operations

The DGPV (DDP, DPVC, DIMA) provides the following functions:

- Sharing of information between INERA and decentralized bodies of MAAH and partners
- Implementation of prevention and response operations
- Training of workers in decentralized bodies
- Writing reports about the cassava viral outbreak situation
- Seed checking and certification

The DRAAH provide the following functions:

- Surveillance of threats
- Checking plant material at borders and quarantining
- Collection and transmission of information about the threats

The EOC's financial and accounts manager provides the following functions:

- Financial and accounting management
- Implementation of contracts
- Creation of financial reports

Recruitment Strategy

EOC workers are managers from MESRSI and MAAH, and are appointed by their employer because of their level of involvement in the development of root and tuber crops in general and cassava and sweet potato in particular. They fulfill the duties assigned to them in accordance with the level of responsibility they hold in the EOC.

However, for particular projects, people with specific competencies may be recruited to support the EOC. The latter are recruited via a call for candidates.

Training

Existing staff: Staff from the EOC are from specialized bodies in the MESRSI and MAAH. In this capacity, they have the minimum required qualification to perform their duties.

However, specific capacity building can periodically be provided, on key themes, in order to make the EOC more effective.

New employees: They will receive technical training in order to be fully operational.

Financial and Material Resources

Financial Requirements

This plan will cost over 6 billion FCFA over the 5-year implementation period. Around 2 billion FCFA will be investment, and 4 billion will be operational costs and salaries. Costs over the five years are as follows:

Table 5: 5-year Budget

Year 1	2,355,693,600 FCFA
Year 2	367,450,000 FCFA
Year 3	463,450,000 FCFA
Year 4	367,450,000 FCFA
Year 5	445,450,000 FCFA

Material Needs

The planned investments for establishing and running the EOC are:

- A building to house the staff and the various laboratories (ideally)
- Vehicles
- Additional laboratory equipment

Resource Management Plan

Resources will be managed in accordance with current procedures and regulations for the management of projects and programs in Burkina Faso. Internal and external audits will be carried out to ensure appropriate use of resources.

Partnerships

- WAVE partner members
- IITA

- Root Tuber and Banana (RTB)
- Burkina National Union of Seed Producers (UNPSB)
- Technical and financial partners

IV. EMERGENCY ACTION PLAN

Actions to be Taken before an Outbreak

Table 6: Actions to be taken before an outbreak

	Risk analysis and definition of risk level	Planning	Monitoring	Prevention	Community and engagement	Partnerships
Actions	<ol style="list-style-type: none"> All the actions will target the following viruses: ACMV, EACMCV, EACMV-UG 	<ol style="list-style-type: none"> Inform and raise awareness among stakeholders (producers, field workers) Train field workers in how to recognize and manage viruses Refine diagnostic tools Create production and inspection standards Identify resistant varieties 	<ol style="list-style-type: none"> Periodic surveillance, every 2 years Ongoing monitoring of production sites by agricultural workers 	<ol style="list-style-type: none"> Control movements of cuttings from infected areas to the rest of the country Create a functional system for propagation and distribution of healthy cuttings Replace cuttings by bringing healthy cuttings into disease zones Propagation of cuttings in areas with low viral levels 	<ol style="list-style-type: none"> Ongoing surveillance from units 	<ol style="list-style-type: none"> WAVE partner members IITA Root Tuber and Banana (RTB) Burkina National Union of Seed Producers (UNPSB)

in charge	INERA	INERA DGPV	INERA DGPV DRAAH	INERA DGPV DRAAH UNPSB	Producers CVD Municipalities Local authorities	WAVE partner members IITA Root Tuber and Banana (RTB) Burkina National Union of Seed Producers (UNPSB)
Process	<ol style="list-style-type: none"> 1. Polymerase Chain Reaction (PCR) 2. Rolling Circle Amplification (RCA) 3. Cloning 4. Sequencing 5. Phylogenetic analysis 	<ol style="list-style-type: none"> 1. Development of training modules 2. Varietal selection 3. Creation of communication materials (leaflets, posters, videos, T-shirts, hats etc.) 	<ol style="list-style-type: none"> 1. Georeferenced sampling every 2 years 2. Phytosanitary monitoring and supervision 	<ol style="list-style-type: none"> 1. Production and distribution of healthy cuttings 2. Make the cassava seed system functional 3. Check plant material at the borders 	<ol style="list-style-type: none"> 1. Creation of communication materials (leaflets, posters, videos, local radio, T-shirts, hats etc.) 2. Visits with guidance Regular meetings with producers via platforms 	<ol style="list-style-type: none"> 1. Via platforms
Frequency	- Year 1 to Year 5	- Year 1 to Year 5	- Year 1 to Year 5	- Year 1 to Year 5	- Year 1 to Year 5	- Year 1 to Year 5

In summary:

There is a risk of emergence of cassava viral diseases in Burkina Faso, and a description of the viruses reveals that the threats are African cassava mosaic virus, African cassava mosaic Cameroon virus (EACMCV) and East African cassava mosaic virus, Uganda variant (in 2009). These threats exist, and are largely unrecognized by producers, who risk spreading disease by exchanging cuttings. The institute for the environment and agricultural research (INERA) which is responsible for the country's agricultural research, has developed the capacity to analyze and monitor viral populations throughout the country, with the assistance of the WAVE project. This expertise, which was acquired over years, will make it possible to plan, monitor

and prevent disease outbreaks. This will be done by joint actions carried out by the technical services of the ministry for agriculture and scientific research, with the development of training modules, varietal selection, creation of communication materials, georeferenced sampling, phytosanitary monitoring and supervision, the production and distribution of healthy cuttings, making the cassava seed system functional, checking plant material at the borders. Local communities will be heavily involved in these actions, and farmers' organizations will be engaged.

Actions in the Event of an Outbreak

Table 7: Actions in the event of an outbreak

	Detection, identification and confirmation	Response, containment, quarantine and elimination	Activation of system	System operation	Evaluation of response
Actions	<ol style="list-style-type: none"> 1. Identification of virus type by national laboratories. Emphasis will be put on EACMV-UG:, CBSV and UCBSV 	<ol style="list-style-type: none"> 1. Containment 2. Inform/raise awareness 3. Elimination 	<ol style="list-style-type: none"> 1. Trigger response plan 	<ol style="list-style-type: none"> 1. Activate response plan 	<ol style="list-style-type: none"> 1. Evaluate the effectiveness of the response, focusing on the following: Reaction time of NTC teams, effectiveness of methods used to contain the virus
Responsible	DRAAH/DRREA DGPV/INERA Surveillance units	DGPV/DRAAH Local authorities INERA	The national technical committee Government	Surveillance units DRAAH/DRREA DGPV/INERA	National technical committee (NTC)

Process	<ol style="list-style-type: none"> 1. Observation of surveillance units 2. Sampling 3. Laboratory analysis 	<ol style="list-style-type: none"> 1. Contain the zone 2. Destroy infected plantations 3. General surveys of surrounding zones 4. Contain the zone 5. Destroy infected plantations 6. General survey of surrounding zones 7. Information and awareness campaign 	<ol style="list-style-type: none"> 1. Launch a nationwide alert 2. Rapid report from NTC to MAAH about the threat, and recommendations of actions to take 3. Verbal advice at council of ministers 	<ol style="list-style-type: none"> 1. Mobilization of human and material resources 2. Deployment of response resources 3. Supervision 4. Passing information upwards 	<ol style="list-style-type: none"> 1. Field visit 2. Assessment of how advanced the response is 3. Production of reports on the changing threat and actions to be considered
Frequency	- As soon as there is suspicion	- As soon as outbreak is confirmed	- As soon as the government authorizes	- As soon as resources are mobilized	- As soon as response is deployed

In summary:

If an outbreak of infection is suspected, there should be very rapid initiation of detection, identification and confirmation of the causative pathogen. And, as soon as an outbreak is confirmed, intervention should begin in order to contain and eliminate diseased plants. In concrete terms, this involves containing the zone, destroying infected plantations, carrying out surveys in surrounding zones, and conduct an information and awareness campaign. This will all be done with the agreement of the government, which will be informed of the technical report written by the national technical committee for via verbal advice at council of ministers, given by the minister for Agriculture. The human, material and financial resources will be mobilized at all stages in the process, for effective action under the supervision of the national technical committee. The national technical committee will produce reports about the changing situation.

Phytosanitary Measures

Law 025-2017/AN Concerning Plant Protection in Burkina Faso

This law regulates the health protection of plants, plant products and other regulated items, including modern biotechnology products, in Burkina Faso. It affects all areas of plant protection, with the following aims:

- To protect the country from the introduction and spread of harmful organisms that could affect the health of cultivated or wild plants, or the quantity and quality of harvests
- To tackle the harmful organisms that cause damage to the quality and quantity of agricultural, forestry and fodder products, while ensuring that the effects on human and animal health and the environment are kept at an acceptable level, particularly when phytopharmaceuticals are used
- Promote the quality of plant products for domestic consumption and export

Article 25 of this law states that any person who observes or suspects that there is a quarantined or harmful organism in a growing plot is obliged to declare this to the competent phytosanitary authority in the relevant jurisdiction.

Seed Systems

There are regulations for plant seeds in Burkina Faso, and these are well-established for dryland farmed crops such as maize, sorghum, millet, cowpea, etc. But there is currently no such system for cassava. The cassava seed system is currently being developed, and seed inspectors from the ministry of agriculture have been trained. This system will enable certification of production and propagation of cassava cuttings in Burkina Faso.

Vector Control

There is no vector control program, as there is for human diseases, with the eradication of the tsetse fly or mosquito treatments for malaria and dengue fever. Treatments are localized, and are administered by producers if there are large outbreaks of whitefly, and involve products recommended by the Sahel pesticides committee.

Communication and Awareness

The law on plant protection in Burkina Faso states, in article 8, that the government supports the organization, leadership and training of producers, phytosanitary service providers and owners and managers of rural and urban land in integrated ways to tackle plant damage.

V. OPERATIONAL STRATEGY

Strategy Implementation Plan

Road Map

Table 8: Activity timeline

Strategic objectives	Expected outcomes	Activities	2019		2020		2021		2022		2023	
			S1	S2	S1	S2	S1	S2	S1	S2	S1	S2
1. Establish a functional surveillance system for viral threat to root and tuber crops	Outcome 1: Two national workshops organized to inform and coordinate the various stakeholders in the cassava value chain	1.1. Organize a national information workshop	x									
		1.2. Organize a national workshop for dialog with stakeholders in the cassava value chain	x									
	Outcome 2: NTC regulatory texts written and the various implementation committees are set up	1.3. Write the NTC's regulatory texts	x									
		1.4. Set up National Technical Committee	x									
		1.5. Set up regional surveillance committees	x									
2. Establish a functional surveillance system for	Outcome 1: Cassava production zones are mapped, and the extent to which cuttings move across borders is determined	2.1. Map production zones		x	x							

viral threat to root and tuber crops													
		2.2. Continue mapping of viral threats		x					x				x
		2.3. Evaluate the extent to which cassava cuttings move within the country and across borders		x									
	Outcome 2: Operational surveillance in cassava production zones	2.4. Collect and characterize the national cassava germplasm		x	x	x	x						
		2.5. Operationalize surveillance in cassava production zones	x	x	x	x	x	x	x	x	x	x	x
3. Operationalize the system for control, certification and quarantine of seeds for root and tuber crops	Outcome 1: Production and distribution of cassava seed are regulated, and the quarantine system for infected cuttings is operational	3.1. Create production standards for healthy seed for cassava cuttings	x	x									
		3.2. Create an inspection protocol for cassava cuttings		x									
		3.3. Operationalize the unit that will clean and conserve the cassava germplasm in vitro	x	x	x	x	x	x	x	x	x	x	x
		3.4. Operationalize the quarantine system		x	x	x	x	x	x	x	x	x	x
		3.5. Create a georeferenced directory of cassava seed producers		x					x				x
		3.6. Organize inspections of seed plots by the NTC					x		x		x		x

4. Build the technical and material capacity of prevention, surveillance and response stakeholders	Outcome 1: All key staff in the CNT are trained, as are key stakeholders in the cassava value chain	4.1. Train members of surveillance units		X					X					X
		4.2. Train seed inspectors		X					X					X
		4.3. Train seed producers		X					X					X
		4.4. Train phytosanitary inspectors and auditors		X					X					X
		4.5. Train agricultural extension agents		X					X					X
		4.6. Train cassava producers		X	X	X	X	X	X	X	X	X	X	X
		4.7. Training for technicians and researchers		X	X	X	X	X	X	X	X	X	X	X
		4.8. Procure additional equipment to help the in vitro culture laboratory to function	X	X										
	Outcome 2: The equipment required for phytosanitary response and control is procured and operational	4.9. Procure equipment and materials for phytosanitary checks on the ground	X	X										
		4.10. Procure additional equipment to help the virology laboratory to function	X	X										
		4.11. Procure greenhouses, one of which should have security level 2, for quarantine services	X	X										

5. Develop and implement a communications strategy to support prevention and response actions	Outcome 1: Cassava viral threats are well known by all stakeholders, and there is national awareness	5.1. Create a communications strategy		x										
		5.2. Produce radio/TV programs	x	x	x	x	x	x	x	x	x	x	x	x
		5.3. Produce documentary films		x	x	x	x	x	x	x	x	x	x	x
		5.4. Create posters, technical specifications, leaflets, etc.	x	x	x	x	x	x	x	x	x	x	x	x

Resource Mobilization Plan

- Funding sources are the WAVE program's financial partners, and other technical and financial of the Burkina Faso Government.
- The Government of Burkina Faso will contribute to funding for staff salaries and electricity and water costs.

Management of Risks Associated with Implementation

Insecurity and other risk factors are present in Burkina Faso. However, all risks will be assessed by the NTC, which will make decisions in accordance with Burkina Faso's regulations and laws.

Monitoring and Evaluation Plan

Table 9: Monitoring and evaluation plan table

Strategic objectives	Expected outcomes	Activities	Monitoring indicator	Monitoring frequency	Responsibility for monitoring	Monitoring sources	Assumptions	Evaluation frequency	Responsibility for evaluation
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1. Establish a functional surveillance system for viral threat to root and tuber crops	Outcome 1: Two national workshops organized to inform and coordinate the various stakeholders in the cassava value chain	1. Organize a national information workshop	Number of workshops organized	Once a year	NTC	Workshop reports	Stakeholders in the value chain are committed	Every two years	NTC
		2. Organize a national workshop for dialog with stakeholders in the cassava value chain	Number of workshops organized	Once a year	NTC	Workshop reports	Stakeholders in the value chain are committed	Every year	NTC
	Outcome 2: NTC regulatory texts written and the various implementation	1. Write the NTC's regulatory texts	Number of regulatory texts	Once every 5 years	MAAH and MESRSI	Existence of texts	Stakeholders are aware of the need to work together	Once every 5 years	MAAH and MESRSI

	committees are set up								
		2. Set up National Technical Committee	Number of regulatory texts	Once every 5 years	MAAH and MESRSI	Existence of texts	The ministries are aware of the need to work together	Once every 5 years	MAAH and MESRSI
		3. Set up regional surveillance committees	Number of regulatory texts	Once every 5 years	MAAH and MESRSI	Existence of texts	The ministries are aware of the need to work together	Once every 5 years	MAAH and MESRSI
2. Establish a functional surveillance system for viral threat to root and tuber crops	Outcome 1: Cassava production zones are mapped, and the extent to which cuttings move across borders	1. Map production zones	Existence of distribution maps and diagrams showing movement of cuttings in border areas	Once a year	NTC	Existence of maps and diagrams	Stakeholders are aware that understanding these movements can help prevent these viral diseases from spreading	Once a year	NTC

	is determined								
		2. Continue mapping of viral threats	Existence of distribution maps of viral threats to cassava	Once every 2 years	NTC	Existence of maps	Stakeholders are committed to monitoring viral threats	Once every 2 years	NTC
		3. Evaluate the extent to which cassava cuttings move within the country and across borders	Existence of diagrams showing movements of cassava cuttings	Every year	NTC	Existence of diagrams	Stakeholders are committed to monitoring these movements to prevent viral diseases	Once a year	NTC
	Outcome 2: Operational surveillance in cassava production zones	1. Collect and characterize the national cassava germplasm	Existence of a variety of genotypes at the INERA/WAVE research station	Every year	NTC	Existence of cassava genotypes	Stakeholders are committed to understanding which germplasms are	Once a year	NTC

							circulating within the country		
		2. Operationalize surveillance in cassava production zones	There is effective surveillance in production zones	Every year	NTC	Existence of reports	Stakeholders are committed to active surveillance	4 times a year	NTC
3. Operationalize the system for control, certification and quarantine of seeds for root and tuber crops	Outcome 1: Production and distribution of cassava seed are regulated, and the quarantine system for infected cuttings is operational	1. Create production standards for healthy seed for cassava cuttings	There are standards for the production of health cassava cuttings	Once every 5 years	NTC	Existence of standards	Stakeholders are aware that seed production standards are needed	Once a year	NTC
		2. Create an inspection protocol for cassava cuttings	There is an inspection protocol for cassava cuttings	Once every 5 years	NTC	Existence of inspection protocol	Stakeholders are aware of the need for this protocol	Once a year	NTC

		3. Operationalize the unit that will clean and conserve the cassava germplasm in vitro	Cleaning and conservation unit is operational	Once a year	NTC	Existence of the unit in INERA	Stakeholders are committed to a seed system	Once a year	NTC
		4. Operationalize the quarantine system	The quarantine system is operational	Once a year	NTC	Existence of quarantine services	Stakeholders are committed to having functional quarantine services	Once a year	NTC
		5. Create a georeferenced directory of cassava seed producers	The directory of seed producers exists	Once a year	MAAH/MES RSI	Existence of directory	Stakeholders are committed to cleaning the cassava seed system	Once a year	MAAH/MES RSI
		6. Organize inspections of seed plots by the NTC	Number of inspections carried out	4 times a year	NTC	Existence of reports	Stakeholders are committed to cleaning the cassava seed system	4 times a year	NTC

4. Build the technical and material capacity of prevention, surveillance and response stakeholders	Outcome 1: All key staff in the CNT are trained, as are key stakeholders in the cassava value chain	1. Train members of surveillance units	Number of surveillance units trained	4 times a year	NTC	Existence of reports	Stakeholders are committed to building technical capacity	4 times a year	NTC
		2. Train seed inspectors	Number of inspectors trained	4 times a year	NTC	Existence of reports	Stakeholders are committed to building technical capacity	4 times a year	NTC
		3. Train seed producers	Number of seed producers trained	4 times a year	NTC	Existence of reports	Stakeholders are committed to building technical capacity	4 times a year	NTC
		4. Train phytosanitary inspectors and auditors	Number of inspectors and monitoring	4 times a year	NTC	Existence of reports	Stakeholders are committed to building	4 times a year	NTC

			workers trained				technical capacity		
		5. Train agricultural extension agents	Number of extension agents trained	4 times a year	NTC	Existence of reports	Stakeholders are committed to building technical capacity	4 times a year	NTC
		6. Train cassava producers	Number of producers trained	4 times a year	NTC	Existence of reports	Stakeholders are committed to building technical capacity	4 times a year	NTC
		7. Training for technicians and researchers	Number of technicians and researchers trained	Once a year	NTC	Existence of reports and dissertations	Stakeholders are committed to building technical capacity	Once a year	NTC
		8. Procure additional equipment to help the in vitro culture	Equipment is procured	Once every 5 years	NTC	Equipment is available and functional in the laboratory	Stakeholders are committed to obtaining the tools to create high-quality seed	Once every 5 years	NTC

		laboratory to function							
	Outcome 2: The equipment required for phytosanitary response and control is procured and operational	1. Procure equipment and materials for phytosanitary checks on the ground	Equipment is procured	Once every 5 years	NTC	Equipment is present and functional	Stakeholders are committed to obtaining the tools to create high-quality seed	Once every 5 years	NTC
		2. Procure additional equipment to help the virology laboratory to function	Equipment is procured	Once every 5 years	NTC	Equipment is present and functional	Stakeholders are committed to obtaining the tools to create high-quality seed	Once every 5 years	NTC
		3. Procure greenhouses , one of which should have security level 2, for quarantine services	Greenhouses are built	Once every 5 years	NTC	Greenhouses are functional	Stakeholders are committed to obtaining the tools to create high-quality seed	Once every 5 years	NTC

5. Develop and implement a communications strategy to support prevention and response actions	Outcome 1: Cassava viral threats are well known by all stakeholders, and there is national awareness	1. Create a communications strategy	A communications strategy exists	Once a year	NTC	Reports	Stakeholders are committed to effective communication	Once a year	NTC
		2. Produce radio/TV programs	Radio and TV programs are produced	4 times a year	NTC	Existence of programs and reports	Stakeholders are committed to effective communication	4 times a year	NTC
		3. Produce documentary films	Documentary films are produced	4 times a year	NTC	Existence of films and reports	Stakeholders are committed to effective communication	4 times a year	NTC
		4. Create posters, technical specifications, leaflets, etc.	Posters and specifications are produced	4 times a year	NTC	Existence of posters, technical specifications and reports	Stakeholders are committed to effective communication	4 times a year	NTC

