Dalberg

Designing Concrete Action Plans to Mitigate the Viral Disease Threats in West and Central Africa

Response plan template

Contents

FORWARD BY THE MINISTER OF AGRICULTURE

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The creation of the Emergency Operations Center (EOC) ensures rapid responds and inputs preparation at the heart of our strategy in the management of plant health emergencies. The Ebola Virus Disease outbreak in West Africa has demonstrated the weakness of our health systems in the face of large-sale. Thus from experience in the past we are strengthening prevention, detection, and coordination in our crisis management relating to the agricultural sector.

There has been past regional initiatives to combat Cassava Mosaic Disease includes efforts by the West Africa Agricultural Productivity program supported by the world bank and the Plant Wise Project. Currently Economic Community of West Africa State (ECOWAS) has established the Sanitation and Phytosanitary Sanitary and National Plant Protection Organisation committee in addressing pests and diseases of crops including cassava viruses. At national level, the Crop Protection Unit in collaboration with the National Research Institute have established routine surveillance activities for the detection of viruses.

The EOC must coordinate detection, diagnosis and response activities through strong leadership and a shared vision for all operations. Its implementation and reporting will take a concerted and multi-sectoral approach.
I want to highlight the four principles that will guided the development of this three-year strategic action plan of the EOC:

- **Cooperation and partnership**: The establishment of the EOC is geared towards strengthening of the entire Sierra Leone plant health risk management system. A culture of collaboration and sharing must be developed and is essential in addressing the present health risks of our nation. The EOC will define and coordinate the mechanisms of preparation and response of all actors. Lessons will be drawn from the preparedness and response actions and will, in partnership with sister structures and organizations, to improve the effectiveness of the system.
- **Capacity development and technical support**: The EOC will identify capacity needs and build the human and infrastructure capacity to strengthen entire plant health management system. The EOC will derive technical support from development partners.
- **Awareness creation and management**: The EOC will be proactive in stakeholders and community sensitization on the emerging viral threats, control options and promote the development of policies and laws that enhance the management of diseases
- **Communications and experience sharing**: The aim will be to share the lessons and good practices of the health emergency community and to strengthen the entire international system. Strengthen regional collaboration and ensure effective communication, knowledge sharing and coordination among stakeholders of the EOC

Hon. Joseph Jonathan Ndanema
Minister of Agriculture and Forestry

EXECUTIVE SUMMARY

Cassava is the most important root and tuber crop after rice in Sierra Leone. The ministry of Agriculture and Forestry (MAF) is committed to increasing cassava productivity through crop diversification program. There is a risk with the introduction of the cassava brown streak virus. In the absence of resistant varieties CBSVD has the potential to completely wipe out cassava in Sierra Leone causing hunger, malnutrition and poverty. Farmers in Sierra Leone still cultivate the local varieties susceptible to the (ACMV). Recent studies have revealed the existence of the East African Cassava Mosaic Virus (EACMV) in the country which has led to serious yield reduction among local varieties infested.

Designing concrete plans to mitigate viral threats requires a national response plan. This includes measures for prevention, detection, containment and eradication of viral threats. Strategic objectives of the response plan include: Establishment of an emergency operating center for emerging viral threats within the existing early warning system; Strengthen human and infrastructural capacity to respond to emerging viral threats; Raise awareness on the emerging viral threats, control options and promote the development of policies and laws that enhance the management of diseases; Strengthen regional collaboration and ensure effective communication, knowledge sharing and coordination among stakeholders.
The national response plan makes provision for the establishment of the emergency operational centers anchored within the ministry of Agriculture and Forestry (MAFS). The EOC will be supervised by National task force on cassava viruses headed by Hon Minister.

Operations of the EOC will include prevention, surveillance, mitigation, containment and eradication measures. An operational fund will be opened to facilitate the activities of the EOC and a crisis management account to be used during a crisis.

The EOC as the coordinating body will form a strategic partnership with international partners such as the WAVE project, FAO, IITA, WFP, European Union and USAID as well as relevant organization within the country.

Operations of the EOC would ensure preparedness through capacity building, community awareness raising and involvement of research institution and universities. Readiness of surveillance system would require risk mapping, prioritization of threats and planning using tested standard operational procedures (SOPs) to mitigate threats. Management of all activities shall be in accordance with SOPs, including prevention, mitigation, detection and monitoring, before, during and after a crisis. Research directorate of the EOC shall oversea data Collection, consolidation and analysis throughout crisis in collaboration with research institutes and universities. Communication about disease risks and outbreaks, preventive and reactive measures, and outcomes shall be done through the communication unit

A roll out plan is also important to end response activities instituted by Government. Effective communication is key and the progress of the situation should be made to inform stakeholder on current situation until the last case is reported. A period of two (2) years with no reported case would be allowed before declaration of end of crisis.

I. CONTEXT

Current situation on Cassava Viral Threats in the Country

Economic and social importance

Cassava is the most important food crop after rice in Sierra Leone (Fomba *et al* 2011). Sierra Leone is ranked the 7th among producers of fresh tubers estimated at 350,000 mt per annum in West Africa (Sanni *et al* 2009). The Ministry of Agriculture and Forestry (MAF) is committed to increasing cassava production, productivity, processing and marketing along the value chain by promoting crop diversification program. Recent developments in value addition has seen an increase in yield due to the use of improved cassava varieties. Consequently, the emergence of cassava processing industries which have increased the shelf-life of cassava and increased income, contribute to food security and improve household livelihood (DONATA, 2010). The crop has combined abilities to produce high yields under marginal conditions and store harvestable portion underground until needed. This makes it a "classic" food security crop. Since cassava is drought-tolerant, thus when matured it can survive a period of six months without rain and can adapt to wide range of agro-ecologies. The main nutritional component of cassava is carbohydrate; also the leaves have excellent nutritional value for humans and animals consumption and are highly marketable. The leaves, stems and tubers contribute significantly to income generation and livelihood in many rural farming communities especially for women and youths.

Despite the potential of cassava in terms of it social-economic benefits in Sierra Leone, the prevalence of cassava viral diseases (African Cassava Mosaic Virus Disease (ACMVD), Cassava Brown Streak Virus Disease (CBSVD), East Africa Cassava Mosaic Disease (EACMD)) hinders production and productivity. The resilience of the viral diseases within the farming system poses a serious risk of food shortages (reduce yield and quality) especially during the hunger season (July – September) when our staple food rice is in short supply. A far greater risk lies with the introduction of the Cassava Brown Streak Virus. In the absence of resistant varieties CBSVD has the potential to completely wipe out cassava in Sierra Leone causing hunger, malnutrition and poverty.

Summary of current situation:

A nationwide assessment conducted in 2010 and 2014 to assess the status of cassava viral threats, indicated that majority of the farmers in Sierra Leone still cultivate the local varieties that are susceptible to the (ACMV). Recent studies have revealed the existence of the East African Cassava Mosaic Virus (EACMV) in the country, which has led to serious yield reduction among local varieties infested (Samura et.al, 2014). The Government of Sierra Leone through the Sierra Leone Agricultural Research Institute (SLARI) has released fourteen improved cassava genotypes that are resistant to the cassava mosaic diseases. Efforts are being made to promote the use of pro-vitamin A cassava and the deployment of improved varieties. This action has been supported by West Africa Agricultural Productivity Program (WAAPP), Alliance for Green Revolution in Africa (AGRA), Smallholder Commercialization and Agribusiness Development Project (SCADeP), Dissemination of New Agricultural Technologies in Africa (DONATA), and Common Funds for Commodities (CFC) etc. A critical need for Sierra Leone is to understand the cultural and traditional use of local varieties. Mitigating the CBSD threats would require swift action plan and a coordinating center. There is a need to develop resistance varieties, improve in phytosanitary and quarantine systems, seed system, diagnostics facilities, the deployment of varieties and strengthening capacity for surveillance and early warning system.

Mapping of key stakeholders

Along Cassava Value Chain

Inputs	Production	Storage and Transport	Transformation	Marketing and Promotion
• Land owners • Financial institutions • Agro dealers • Research • Fabricators • Seed dealers	• Farmers • Seed producers • Seed multiplication	• Drivers • Motor bike riders • Store owners	Cassava processors	• Marketers • Seed dealers • TV and Radio stations • Social media platform • Mobile phone companies • Village town criers

Other Public and Private Actors

Institutions	Potential Role in EOC	Contact
Office of National Security	National Institution for disaster and risk management	OAU Drive Tower Hill, Freetown
Sierra Leone Agricultural Research Institute	Breeding for resistance, training on disease diagnosis and management, Tissue Culture and SAH (Rapid Multiplication Techniques), training of trainers	PMB 1313, Tower Hill, Freetown
Ministry of Health	Collaboration and experience sharing	4th Floor, Youyi Building, Brookfields, Freetown
Universities (Njala, FBC, Unimak)	Training of technical staff and farmers	School of Agriculture, Njala University, Njala Campus; Biological Sciences Department, FBC and Agriculture Department; Unimak
MAF	Host institution, information dissemination, training of farmers	2nd Floor, Youyi Building, Brookfields, Freetown
NGO's / INGO's	Collaboration, funding, training of technicians and farmers	All districts
Media	Dissemination of information	SLBC, AYV and Communities radio
SLeSCA	Regulate seed	Tower Hill, Freetown
Local Councils	Collaboration with MAF	All local councils
EPA	Environmental impact issues	Old Railway Line, Brookfields, Freetown

The current crisis management process

Prevention, Mitigation, and Preparedness

Preventive measures that exclude the viral-related pathogen from the host include proper phytosanitary policies and measures, strengthening quarantine facilities ready for rapid diagnostics capabilities, promotion of best agricultural practices and awareness creation:

- A well-coordinated seed system that ensures propagation and commercialization of the desired planting materials with the full compliance to the law which guides the production, sale, import and export of seeds.
- Introduction of resistant varieties and restriction in the movement of planting materials especially from disease prone areas.
- Routine surveillance and early warning system, training on early detection and management, use of molecular based assays capacity strengthening are key strategies to prevent disease infection.

The use of resistant varieties to viral disease remains one of the most effective means of managing viruses in Sierra Leone. This can be done through introduction of new resistance varieties or through conventional cassava breeding programs. Since issues of adoption are a concern other methods such as tissue culture and Semi Autotropic Hydroponic (SAH) are being used as alternative to get virus-free planting materials to farmers.

Recent studies have shown that the use of azadiractin could be used to suppress diseases expression when cuttings are immersed in neem extracts (Samura et al, 2017). Restriction of movement of planting materials at international and local level should be implemented to contain disease spread. Just like the Ebola outbreak, Sierra Leone has inadequate personnel, resources and infrastructure to respond rapidly to viral threats.

Capacity building, effective surveillance, early detection mechanism and the deployment of resistant and virus free planting materials through the seed certification system could be one of several measures to be taken. This would require the formulation of new policies and laws to ensure compliance to standards. The One Health Platform provides a portal through which issues of emerging viral threats could be addressed. Other developing partners such as the WAVE program, IITA and FAO remain key partners in mitigating viral threats of cassava.

Detection and Response

Detection of viruses in the field is basically through visual symptoms. More advance nucleic acid based techniques are currently available such as polymerase chain reaction (PCR) and Elisa which are more accurate and reliable are readily available.

Since the first nationwide survey on cassava mosaic disease was conducted in 2010, awareness creation on the high prevalence of the disease and the detection of EACMV had been raised through radio, farmers' sensitization and research publications. In some cases, destruction of plants with mixed infection was recommended. A lot of Government effort has been geared towards promoting improved varieties that meet farmers and consumers desired traits as well as the cassava industry. The last survey was conducted in 2014, was not complemented with diagnostics result to track the spread of EACMV. A more proactive plan is required to track various viruses within the farming system which would include the following:

- The genotypic variation of cassava varieties for breeding purposes and notification of new viruses
- Containment and quarantine measures
- Quality seed and planting materials
- Public awareness on the importance and impacts of the viral threats
- Enforcement of the required laws to mitigate the threats.

The use of rapid multiplication techniques and delivery system for the deployment of new varieties of

Risk Assessment

The possibility of introduction of new viruses such as the CBSV spreading into Sierra Leone unnoticed and unchecked is high. These risks include the introduction and propagation of planting materials infected with CBSV and the EACMV and the Ugandan variant.

Under the current level of preparedness, it is probably when the spread would have reached an alarming level that a response plan could be put in place. This conclusion was derived based on the current realities as follows:

No	Description	Response level		
		Poor	Good	Very Good
1	Ability of the Phytosanitary Unit to perform its functions	✓		
2	Status of Quarantine services	✓		
3	Diagnostic facilities	✓		
4	Availability of a crisis response plan	✓		
5	Surveillance and monitoring	✓		
6	Capacity of personnel response to cassava viral threats	✓		
7	Infrastructure and facilities to respond to threats	✓		
8	Effectiveness of the Seed system		✓	
9	Policy environment		✓	
10	Availability of CBSV resistant / tolerant varieties	✓		

Needs Assessment

Assessment of the existing structure and establishment of a baseline is a pre-requisite for understanding the environment (physical, political and socio economic) of the farming systems, the current level of threats and the ability to respond before, during and after a crisis. The policies and policy instruments that are required to be developed and enacted by parliament include the Phytosanitary and Crop protection policies. The needs of relevant institutions must be assessed. These include:

- Structure
- Governance
- Ability to perform their functions
- Capacity of research institutions and universities to provide training, diagnostic facilities and routine surveillance ability
- Level of preparedness of the phytosanitary and quarantine sections of the Crop Protection Unit to detect cross border threats
- Data management and coordination for a rapid response to viral threats is an important need to ensure the safety of the cassava sub sector. This can be achieved through surveys, interviews, focus group discussions and well-structured questionnaires.
- Establishment of Plant Protection and Regulatory Services Division (PPRSD) in the Ministry of Agriculture and Forestry.

Strengths

Government commitment
Trained personnel
Availability of laboratory space
Existing network of Plant Doctors
Strong regional collaboration
Availability of cassava mosaic resistant varieties
Low vector population

Weaknesses

Weak institutions
Weak diagnostic facilities
Limited financial resources
Poor monitoring and surveillance system
Weak phytosanitary and quarantine systems
Limited trained personnel
Lack of a national response plan for emerging viruses within the national early warning system

Key takeaways

The Government of Sierra Leone has demonstrated commitment in mitigating cassava viral threats through the research system, Universities, Ministries Departments and Agencies (MDAs) including development partners. It is generally accepted that much more resources must be put in place to ensure the safety of the cassava farming communities for increased productivity. This will include

- Development and dissemination of resistant varieties
- Improved capacity building of breeding personnel and seed system
- Improvement in infrastructure and diagnostic facilities
- Enhancing the Crop Protection Unit of MAF in terms of personnel and facilities, strengthening phytosanitary and quarantine sections.

As part of the national response plan there is need for the establishment of an Emergency Operation Center (EOC) for viruses within the existing early warning structure in response to emerging threats.

II. STRATEGIC OBJECTIVES AND VISION OF THE NATIONAL RESPONSE PLAN

Vision

Mitigate existing and emerging viral threats to ensure a healthy and productive cassava farming system through a well-coordinated structure in Sierra Leone.

Strategic Objectives

Strategic Objective 1

Establish EOC for emerging viral threats within the existing early warning system

Strategic Objective 2

Strengthen human and infrastructural capacity to respond to emerging viral threats

Strategic Objective 3

Raise awareness on the emerging viral threats, control options and promote the development of policies and laws that enhance the management of diseases

Strategic Objective 4

Strengthen regional collaboration and ensure effective communication, knowledge sharing and coordination among stakeholders

III. Structure of the Emergency Operation Center

Institutional Anchoring.

It is the view of the Hon. Minister of Agriculture and Forestry that the EOC be anchored within the ministry. There is an existing early warning system within MAF. Since data base on crop protection is limited and data generated from the research and universities are hardly captured, the anchoring of the structure will make it relevant for the availability of all required data. In addition, there is an existing Fall Army Worm (FAW) Response Plan and Technical Committee which shall also serve as the technical committee for viral threats. The national response plan will utilize and build on existing structures and staff of the early warning system unit and additional staff incorporated based on the professional and specific need of the EOC.

Mandate

The legitimacy of the national response plan arises from the regional framework from which Ministers of West and Central Africa committed to the Coutonou declaration. At national level, legitimacy of the EOC is given by the Minister through the Letter of Commitment and the National Phytosanitary Act. Within the Ministry of Agriculture and Forestry, there is Phytosanitary and Plant Protection Policy as an instrument for the establishment of the EOC.

Organizational Oversight

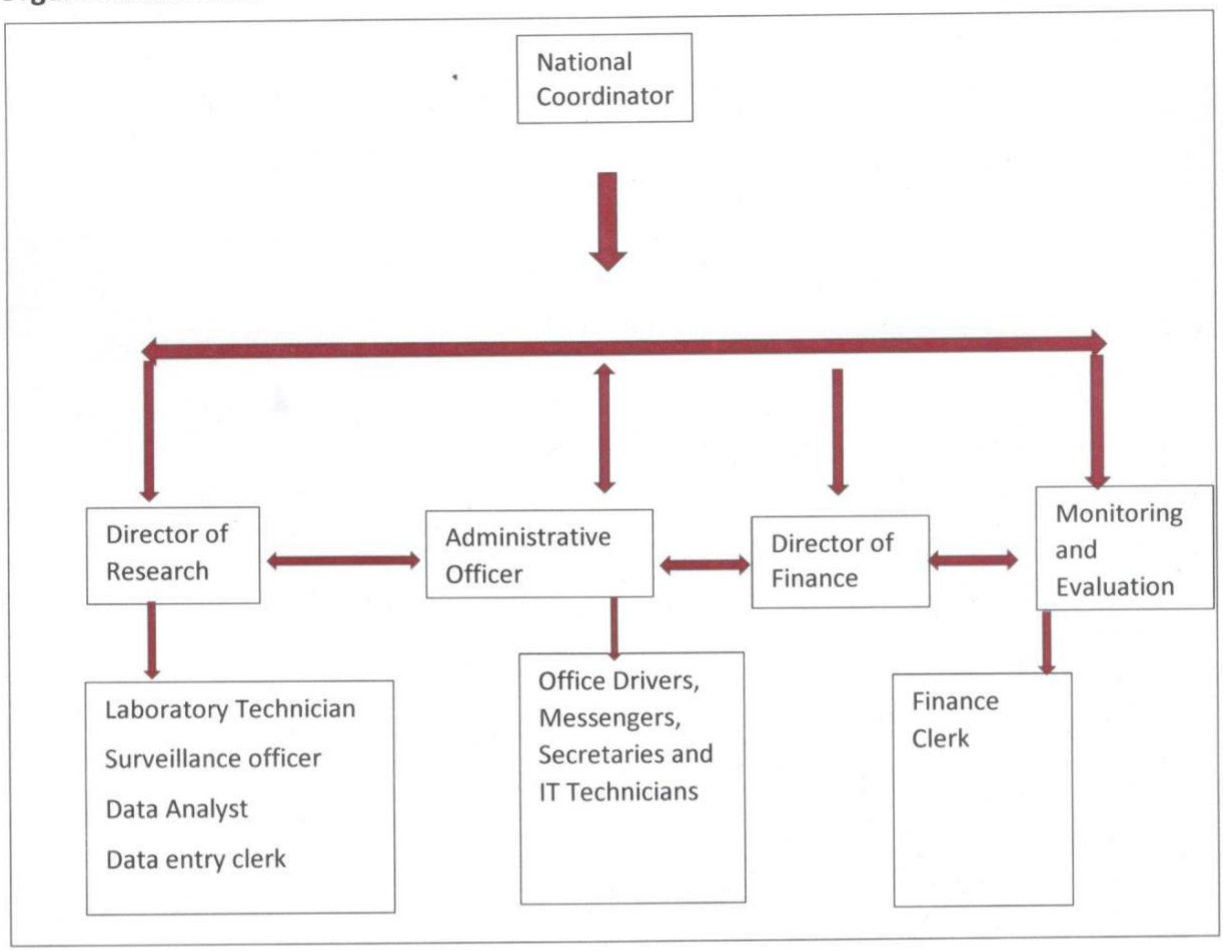
The National Task Force of the EOC of the response plan will be established within MAF and will be headed by Hon. Minister. The next level would be the National Technical Committee on cassava viruses. This is the highest technical level authority that directs and manages affairs relating to cassava viruses. There will be a National Coordinator of the EOC who reports to the Minister through the Director of Crops.

Organizational structure

The Minister of Agriculture and Forestry as the head of the Task Force reports to the President through Cabinet. The Director of Crops reports to the Minister whilst the Head of the Crop Protection Unit who doubles as the EOC Coordinator reports to the Director of Crops.

The Secretariat shall consist of the Coordinator, Administrator, Research Director and Finance Director and Monitoring and Evaluation Officer. The Administrative Department will be assisted by support staff such as drivers, messengers, secretaries and IT Technicians. The Research Department will be supported with Data Analyst, Data Entry Clerk, Surveillance staff and Laboratory and Field Technicians while the Finance staff will be supported by Finance Clerks.

Organizational tree



Human Resources

Core Competencies

Communications, IT, Data analysis, laboratory technicians, field technicians, Breeders, Monitoring and evaluation, Entomologist, epidemiologist, Pathologist

Permanent Staff needs

National Coordinator, Administrative staff, Virologist, Data Entry Clerk, Data Analyst, Surveillance staff, Drivers, Quarantine and Phytosanitary staff, Cleaner, Monitoring and Evaluation Officers

Temporary staff needs

Breeders, Entomologists, Plant Pathologists, Quarantine staff, Tracking and Tracing Officers, Communications Officer, IT Technicians, Laboratory Technicians, Field Technicians, Tissue Culturist, GIS Expert, Extension staff

Recruitment Strategy

Competent staff will be absorbed from the Ministry of Agriculture and Forestry, Research institution and the University.

Training

Training programs will be conducted on diagnostics, disease identification, disease surveillance, forecasting, modelling and simulations, communications, data management and reporting to ensure competency of the key personnel

Roles and Responsibilities

Roles and responsibilities will be defined in the terms of reference designed by the technical committee for key actors. The National Coordinator shall oversee the day-to-day running of the EOC, determine the threat level, mobilize funds for the operations of the EOC, while the administrative staff will provide support to the management; Virologist shall provide technical insight and coordinate research and diagnostic support to the Data Entry Clerk, Data Analyst and Surveillance staff.

Phytosanitary staff shall be deployed at strategic entry points before the crisis. Entomologists and pathologists shall ensure improvement in breeding for resistance and provide strategic deployment of CBSVD resistant genotypes for rapid response during crisis.

Communications Unit shall provide and share information with regards the activities of the

EOC ; ICT Unit shall provide technical services to enhance digital communication and computer

servicing etc.; Laboratory technicians and culturist/SAH Technicians shall be responsible

for diagnostic and rapid multiplication of virus free planting materials to support the response plan while GIS Expert shall map areas of operation and spread of virus diseases to enable extension staff to disseminate technologies and training at community level to mitigate viral threats.

Financial and Material Resources

Financial needs

The financial needs will be categorized based on activities and level of urgency. These activities include prevention, crisis and post-crisis management. It is recommended that two separate accounts be opened. An operational fund to facilitate the day-to-day activities of the EOC will be managed by the EOC. Crisis management account will be maintained by the central government. The operational fund will support routine surveillance, awareness raising, detection and coordination with major stakeholders at national and regional level. The crisis management fund is an emergency fund for out scaling activities to contain and eliminate viral threats, create awareness, intensify research through the development and promotion of technologies that can mitigate the spread of the viral threat. Management of the funds would be nested within the organizational structure of the EOC and disbursement will be in accordance with the financial regulations.

Materials needs Effective

operation of the EOC would require material resources such as physical structures and equipment. This would include office, laboratories and field facilities and equipment including related technologies for cassava. Additional resource required during the crisis would include GIS equipment for mapping, GPS, digital apps compatible with Mobile devise for early detection, deployment of rapid mobile diagnostic facilities at community level, humanitarian support to affected communities and training materials

Resource management plan

Funds for logistics and financial support will be approved based on the response plan. During a crisis funds and material needs will be provided with the approval of the Task Force. Annual Operational funds for the EOC shall be allocated to the National Coordinator based on the mandate within the response plan to disburse for the purpose of prevention and detection. The demand for resources will be prioritized based on the following interventions

1. Prevention: Activities for which resources will be allocated will include surveillance and awareness creation.
2. Detection: Empowerment of the research institutions and university will ensure reliable diagnosis to confirm cases of viruses including the CBSV. Diagnostic facilities will also be placed at the port of entry to ensure that no new virus enters the country.
3. Containment: The Sierra Leone Seed Certification Agency (SLeSCA) through the seed delivery system will ensure that quality planting materials are deployed in areas of vulnerability. Restriction in the movement of planting materials at chiefdom level to contain the spread of the outbreak would require resources that the EOC should disburse according to the disbursement plan within the national response plan.
4. Elimination activities would include deployment of resistant or tolerant genotypes, vector control, quarantine and destruction of infected farms. Employment of full strength staff for surveillance, tracking and training will be provided to eliminate the threat.

Partnerships

The Government of Sierra Leone through the Ministry of Agriculture and Forestry (MAF), Ministry of Foreign Affairs and International Cooperation and Ministry of Development and Economic Planning shall take the lead in the mobilization of funds to operationalize the EOC. The WAVE project, Food and Agriculture Organization, European Union, USAID, GIZ are all potential partners for the establishment and funding of the EOC. Experience will be sought from the Ministry of Health and Sanitation (One Health Program), research institutes, universities and other international partners such as the International Institute of Tropical Agriculture (IITA) etc.

Risk analysis and definition of risk level

Sierra Leone faces the following risks: Current risks include the presence of the EACMV and mixed infection of the EACMV and the ACMV. Eminent threat includes East African Cassava Mosaic Virus (Ugandan variant), and the Cassava Brown Streak Virus (CBSV) Disease. There is dearth of knowledge on virus status for which risk analysis is required. This would involve bench mark surveys, administering of well-structured questionnaires to determine risk, computer simulations and stakeholder analysis.

Prevention

Prevention mechanisms will include a pre-emptive breeding program for East African Cassava Mosaic Virus and the Cassava Brown Streak Virus to develop resistant variety. In addition, massive awareness creation at community level on the symptoms of cassava virus diseases and preventive measures will be put in place through radio, television, sensitization meetings and distribution of flyers.

Empowerment of Phytosanitary and Quarantine section of the Crop Protection Unit of MAF to detect and destroy suspected threats as well as restriction on the introduction of planting materials from infected countries. This action requires strong collaboration with the existing early warning system already in place at MAF.

Surveillance

Data collection and analysis would be coordinated through the EOC. This will involve annual surveys, sample collection and analysis. Surveillance for disease symptoms shall be done nationwide on a quarterly basis would involve existing Plant Doctors and Surveillance Officers trained through the Plant Wise Project and the West Africa Agricultural Productivity Program 1C. Scouting will be done by farmers who will report to Plant Doctors and front extension workers. The use of diagnostic application for disease identification will be adopted and locations geo-referenced for traceability and control.

Mitigation

Mitigating actions would consist of awareness raising and stakeholder sensitization at community level through radio discussions, meetings etc. The EOC would coordinate awareness campaigns through the communication department. The project would fund formulation of regulations and policy to support action against the disease spread. Such provision as stated in the seed policy would require law to enforce sale and use of certified planting materials and improve the seed delivery system to ensure that the desired varieties are deployed to farmers. Where applicable destruction through burning and a compensation plan would be put in place to prevent spread of the viral threat.

Partnerships and coordination

The EOC as the coordinating body will form a strategic partnership with international partners such as the WAVE project, FAO, IITA, WFP, European Union and USAID. National Federation of Farmers in Sierra Leone, paramount chiefs and other local leaders, input supplies and logistics agencies to enable rapid response to viral threats. Experience will be sought from the Ministry of Health and Sanitation Ebola Response Programme, research institutes and universities.

Actions during crisis

Primary Response

Detection, Identification and Confirmation

Based on the organizational structure, the Research Directorate would be responsible for early detection in partnership with the research institute and the University. This will also include collaboration with WAVE regional partners. Threat level will be determined at regional and national level by the National Technical Working Group for cassava viruses based on scientific evidence. Diagnostic capabilities and training on disease identification has to be strengthen for early detection. The level of preparedness is dependent on highly trained partners to respond rapidly. Key personnel to be engaged during a crisis include researchers, surveillance officers, communications and IT unit, laboratory technicians, phytosanitary officers, community leaders and the National Federation of Farmers in Sierra Leone (NaFFSL). The identification and detection of threat is facilitated through the use of annual operation fund. Once the threat level attains a crisis situation, emergency funds should be disbursed by Government upon request by the Minister of MAF to implement mitigating as well as containment measures to eliminate the threat. At this level, a crisis alert would be issued by the EOC for the next level of intervention that would require mitigation, containment and elimination actions. Communication will be reported at community, national, regional and international level through sensitization meetings, publications, trainings and capacity building to identify and control the disease.

Response, Containment, Quarantine and Elimination

Key actors (MAF, SLeSCA, research institutions, university, NGOs and other relevant actors) Trained staff from will be responsible for quarantine activities. Movement and sale of planting materials will follow strict certification guidelines to ensure that virus free planting materials are certified before distribution to the public.

With support from the local council, Customs and police, movement of planting materials will only be allowed upon the production of certificate or labelled product indicating that the planting materials are safe. Undocumented materials would be destroyed. This proactive intervention will be maintained by law until the threat level is eliminated.

Once an alert is issued coordination of all actors and activities related to crisis management will be activated at full strength. Roles and Standard Operating Procedures (SOPs) of various actors for each task i.e. prevention, containment and elimination will be well defined. Preparation for rapid response to crisis including mobilization of human, financial and material resources would be derived from the contingency fund allocated by central government to respond to crisis situation. Relevant communications and update of the status of the infection shall be undertaken by the communications department.

Secondary Response

System activation

Part of the operations of the EOC would be to ensure preparedness through training, drills and purchase of emergency stocks (disease free planting materials). Readiness of surveillance system would require risk mapping, prioritization of threats and planning using tested SOPs to mitigate threats. Management of all activities shall be in accordance with SOPs, including prevention, mitigation, detection and monitoring, before, during and after a crisis. Research directorate of the EOC shall oversee data collection, consolidation and analysis throughout crisis in collaboration with research institutes and universities. Communication about disease risks and outbreaks, preventive and reactive measures, and outcomes shall be done through the Communications Unit through a communication strategy. Mass communication about the threat will be conveyed to all stakeholders and community members through the Communication Unit. Additional staff would involve GIS experts, trackers and surveillance officers and technicians.

Beyond system activation

Plant viruses are difficult to control; therefore, the level of preparedness is planned to extend response activities beyond the emergency system activation. The concept of slash and burn, germplasm replacement and the development of new policies and laws to enforce compliance beyond system activation measures should be employed. A roll out plan is also important to end response activities instituted by Government. Effective communication is key and the progress of the situation should be made to inform stakeholders on the current situation until the last case is reported. A period of two (2) years with no reported case would be allowed before declaration of end of crisis to ensure no further potential threat exists.

Evaluation of the response

The monitoring and evaluation teams shall determine the response capability which will be assessed based on a 1-3 scale where 1: Very Good, 2: Good, 3: Poor on the following conditions:

1. Rationale for triggering the response
2. Effectiveness of the surveillance mechanism during the crisis
3. Equipment, Service and Security of Information and Communication Technologies
4. Detection mechanism
5. Infected Field Case Management
6. Mobilization and disbursement of financial resources
7. Human Resources involvement of different key stakeholders
8. Communication and social mobilization
9. Community cooperation

V. OPERATIONAL STRATEGY

Implementation Plan of the strategy

Community and Engagement

A multi-sectoral approach involving stakeholders in mitigation of viral threats (cassava, rice and other important food crops) will be used for the prevention, detection and response to viral threats.

Community Awareness:

There is need to raise awareness on the economic importance of viruses to food security involving all relevant stakeholders. Information will be provided on the socio economic implications of the virus, identification of symptoms and how to respond, epidemiology of the virus including simulation and forecasting, management options, diagnostic results generated within country and validated at regional level. Information will also be provided on the associated policies, laws, and by- laws for the enforcement before, during and after a crisis.

At the technical level, MAF is strategically poised to coordinate and provide leadership on the actors at all levels to manage the crisis. The National Agricultural Research System (NARS) and NaFFSL are being supervised by MAF. The project will deliberately target the local traditional leaders, media, women's groups, youth groups, farmer based organizations, processors, community - based plant doctors and surveillance officers, transporters, marketers, seed dealers and seed companies, local council and phytosanitary personnel.

The innovation platform approach promoted by CORAF/WECARD provides the framework on which the structure for early detection, alert and containment system can be built. Key personnel of the EOC will be linked with the existing innovation platforms. Community based plant doctors, surveillance officers and extension agents will be attached to the platform as field detectors. In hot spot areas, new platform for plant viruses would be established. Standard operating procedures would be issued within the platform in response to suspected symptoms. Laboratory analysis would be conducted to check for new viral strains based on samples provided by the innovation platform.

Diagnostic results, survey report, simulations and forecasting models will be sent to the Directorate of Research who determines the alert level for the attention of the National Coordinator and the Minister. Once a crisis level is declared by the EOC, the Ministry will request from the government for emergency funds to be disbursed for the activation of crisis mode within the response plan for containment and eradication.

Human, financial and material resource required for this action would involve:

- Mobility for surveillance teams and surveys
- Digital or mobile apps for distant diagnosis
- Fuel and hosting of sensitization meetings,
- Personnel and infrastructure for diagnosis,
- Intelligence gathering
- Electricity, water and internet supply
- Containment zone for plants
- Subsidy for affected farming communities
- Access to media coverage and communication.
- Communication channels used to convey information from the community to the EOC shall be through the Communications Unit personnel attached to the innovation platform or hot spots. Communication messages would be edited and approved by the EOC for massive dissemination through radio, television and sensitization meetings.

Roadmap

Strategic objectives	Project	2019				2020				2021			
Axis 1:		Q 1	Q 2	Q3	Q4	Q 1	Q 2	Q3	Q4	Q 1	Q 2	Q3	Q4
Establish emergency operating center for emerging viral threats within the existing early warning system	Signing of ministerial decree creating the EOC												
	Recruitment of EOC directorate and permanent staff		x										
	Establishment of surveillance mechanism		X										
	Conduct surveillance activities (surveys, detection)												
	Operationalize diagnostic centers												
	Signing of memorandum of understanding with innovation platform												
	Create linkages between IP and EOC												
	Incorporation of crop protection aspect into the early warning system												
	Initiate data collection and processing												
	Establish communication links and facilities												
Axis 2:													
Strengthen human and infrastructural capacity to respond to emerging viral threats	Construction of surveillance outpost in hotspots												
	Establishment of diagnostic laboratory with tissue culture unit and SAH unit												
	Training of stakeholders												
	Attachment to regional Laboratory												
	procurement of logistics: vehicles, laboratory equipment reagents, consumables, office supplies etc)												
	Upgrade electricity, water supply, internet for research centers and EOC directorate												
	Strengthening existing early warning system to incorporate viral threats												
	Establish a data base (Generation, analysis and storage of data)												
	Support research for pre-emptive breeding for CBSVD												
Axsis 3:													

Raise awareness on the emerging viral threats, management options and promote the development of policies and laws that enhance the management of diseases	National Stakeholder meeting													
	Community sensitization meetings		X	x										
	Support to development and enforcement of policies to mitigate viral threats			x	x									
	Multiplication and dissemination of improved varieties			x	x	x	x							
	Deployment of new varieties, demonstration farms			X										
	Promotion of best practice				x	x	X							
Axis 4														
Strengthen regional collaboration and ensure effective communication, knowledge sharing and coordination among stakeholders	Establish and operationalize of a website		x											
	Exchange visits													
	Regional, national meetings													
	Establish a social platform for viral threats(WHATSAPP, FACEBOOK, TWITTER ETC)													
	Study tour/ experience sharing within the sub region													

Upon validation of the national response plan and budget, Initial funding will be sought from the Bill and Melinda gates Foundation through the West Africa Virus Epidemiology Program 'WAVE '. Other potential partners from whom funding could be sought includes the Food and Agriculture Organization of the United Nations (FAO), The European Commission, USAID, other development partners and the Government of Sierra Leone. Short and long term activities requiring funding includes:

- The establishment of the EOC
- Setting of its administrative structure and logistics
- Setting up of a surveillance and early warning system to capture data on incidence and prevalence of viruses
- Introduction of improved resistant genotypes,
- Analysis and strengthening of diagnostic facilities for research
- Short term trainings on specialized areas
- Attachments to regional laboratories and strengthening of the quarantine and phytosanitary section for preventive action are key short term activities.

Funds for crisis management which involves containment and eradication activities, tracing, and mapping, simulations, long term capacity building (PhD and MSc.), preemptive breeding for EACMV (Ug) and CBSVD. Short term activities fall under the preventive and surveillance measures which takes the highest priority especially when the risk level is low. Surveillance and diagnostic facilities as well as lobbying for funds, dissemination of information shall be the routine activity of the EOC. Activation of crisis mode will further intensify and expand activities to include containment and eradication.

Implementation Risk Management

The general assumption is that the political commitment remains positive and the political environment remain stable for the implementation of activities. The development partners and other stakeholders remain committed to funding the response plan. The presence of the viral threat to food security remain high.

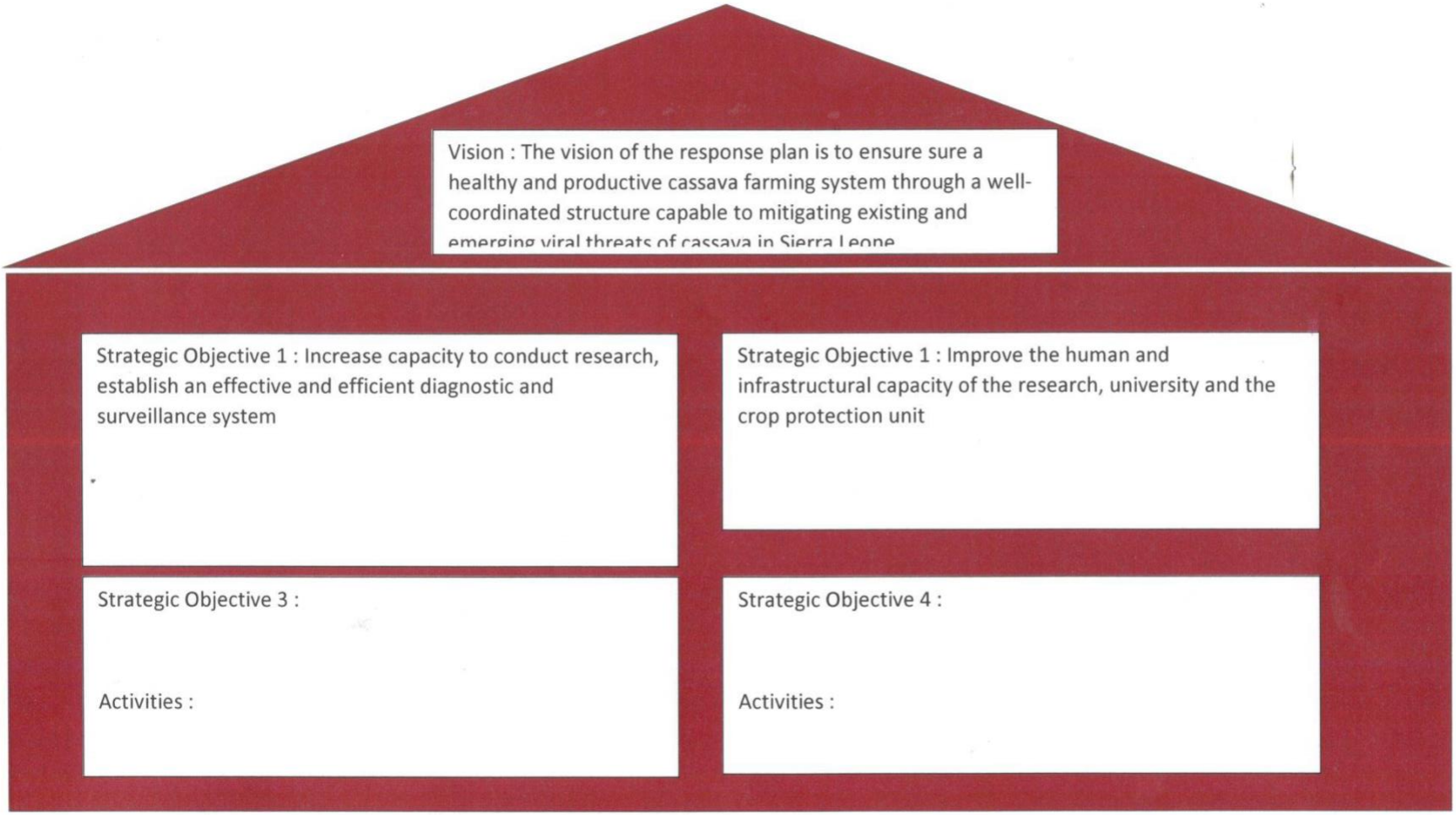
Monitoring and Evaluation Plan

Main Objective: Establish emergency operating center for emerging viral threats within the existing early warning system		Measurable actions	Based on the project	FAO, Wave	Reports of involved structures	Favorable economic and social environment	Based on the project	Independent Expertise
Specific Objective 1: Operationalize an emergency operating center for emerging viral threats within the existing early warning system								
Expected results								
P 1.1	Signing of ministerial decree creating the EOC	Government of SL Document MOU, National budget	Based on the project	FAO, Wave	Reports of Ministries and structures under supervision	Favorable economic and social environment	Based on the project	Independent Expertise
P 1.2	Recruitment of EOC director and permanent staff	Appointment letters and budget line	Annual budget report	MAF, WAVE	Financial report	Favorable economic and social environment	Based on the project	Audit service
P 1.3	Establishment of surveillance mechanism	Numbers times data is collected	Bi-Annual	Wave	Reports from Wave	Effective data collection	-Mid-term evaluation -Impact assessment	Independent Expertise
P 1.4	Conduct surveillance activities (surveys, detection)	Annual meeting report	Annual	Ministry of Agriculture	Meeting reports from Ministry	Effective government involvement	Final evaluation	Internal Expertise
P 1.5	Operationalize diagnostic /Quarantine centers	Number of report	Monthly	WAVE/SLARI MAF	Meeting reports from Ministry	Relevant staff available	-	
P 1.6	Signing of memorandum of understanding with innovation platform	Number of suveys	Annual	WAVE/SLARI MAF	MOU, Activity report	Effective government involvement	-	
P1.7	Conduct training on IP and SOPs	Training conducted and number of SOP developed	Quartely	WAVE/SLARI MAF	Activity report	IP actors committed to the project		
P1.8	Incorporation of crop protection into the early warning system	MOU, COP modules developed	Annual	WAVE/SLARI MAF	Activity report	Effective government involvement		
P 1.9	Initiate data collection and processing	Number of data collected and analysed	Annual	WAVE/SLARI MAF	Activity report	Trained staff available		
P 1.10	Establish communication links and facilities	report publication	Quarterly	WAVE/SLARI MAF	Activity report	Trained staff available		
Specific Objective 2: Strengthen human and infrastructural capacity to respond to emerging viral threats								
P 2.1	Construction of surveillance outpost in hotspots	Number of outpost constructed						
P 2.2	Establishment of diagnostic laboratory with tissue culture unit and SAH unit							

P 2.3	Training of stakeholders							
P 2.4	Attachment to regional Laboratory							
P 2.5	procurement of logistics: vehicles, laboratory equipment reagents, consumables, office supplies etc)							
P 2.6	Upgrade electricity, water supply, internet for research centers and EOC directorate							
P2.7	Strengthening existing early warning system to incorporate viral threats							
P2.8	Establish a data base (Generation, analysis and storage of data)							
P2.9	Support research for pre-emptive breeding for CBSVD							
P 2.10								
Specific object 3 :								
	National Stakeholder meeting							
	Community sensitization meetings							
	Support to development and enforcement of policies to mitigate viral threats							
	Multiplication and dissemination of improved varieties							
	Deployment of new varieties, demonstration farms							
	Promotion of best practice							
Specific objective 4 :								
	Establish and operationalize of a website							
	Exchange visits							
	Regional, national meetings							
	Establish a social platform for viral threats(WHATSAPP, FACEBOOK, TWITTER ETC)							
	Study tour/ experience sharing within the sub region							

ANNEX-TOOLKIT

Example of strategic objectives and vision



NATIONAL RESPONSE PLAN BUDGET

COUNTR	(INSERT COUNTRY NAME HERE)
CURRENCY	$

Budget Period:	FY2019	FY2020	FY2021	FY2022	FY2023
CAPITAL EXPENDITURE	1,570,000.00	125,000.00	-	-	-
OPERATING EXPENDITURE	3,918,000.00	3,858,000.00	3,858,000.00	3,753,000.00	3,753,000.00
CONTINGENCY BUDGET	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00
OVERALL TOTAL BUDGET	7,488,000.00	5,983,000.00	5,858,000.00	5,753,000.00	5,753,000.00

CAPITAL EXPENDITURE	FY2019	FY2020	FY2021	FY2022	FY2023
Rehabiitation of molecular laboratory	150,000.00	-	-	-	-
Office Fixtures	100,000.00	-	-	-	-
Desktop computer	10,000.00	-	-	-	-
Vehicles	150,000.00	-	-	-	-
Equipment(Communication, Laboratory an	450,000.00	50,000.00	-	-	-
Motor bikes	90,000.00	75,000.00	-	-	-
Solar installation for labs	50,000.00	-	-	-	-
Water supply and accessories	20,000.00	-	-	-	-
Internet connectivity	20,000.00	-	-	-	-
Generator (Back up) (50 kva)	30,000.00	-	-	-	-
Construction of out post	300,000.00	-	-	-	-
Office stationaries	10,000.00	-	-	-	-
Construction of screen house	130,000.00	-	-	-	-
Rehabitation of tissue culture and SAH units	60,000.00	-	-	-	-
Add More	-	-	-	-	-

Total Capital Expenditure	**1,570,000.00**	**125,000.00**	-	-	-

OPERATING EXPENDITURE

ALLOWANCES	FY2019	FY2020	FY2021	FY2022	FY2023
Coordinator	24,000.00	24,000.00	24,000.00	24,000.00	24,000.00
Deputy Coordinator	18,000.00	18,000.00	18,000.00	18,000.00	18,000.00
Research Director	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Administrator	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Finance Manager	12,000.00	12,000.00	12,000.00	12,000.00	12,000.00
Temporary Staff jr.	450,000.00	450,000.00	450,000.00	450,000.00	450,000.00
Temporary staff senior	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
inception meeting	10,000.00	-	-	-	-
fuel	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Add More	-	-	-	-	-
Total Salaries	**698,000.00**	**688,000.00**	**688,000.00**	**688,000.00**	**688,000.00**

TRAINING COSTS	FY2019	FY2020	FY2021	FY2022	FY2023
Monitoring & Evaluation	16,000.00	16,000.00	16,000.00	10,000.00	10,000.00
Crisis Management	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Disease diagonistics	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
Disease surveillence	22,000.00	22,000.00	22,000.00	10,000.00	10,000.00
eletritronic data capture and management	20,000.00	20,000.00	20,000.00	10,000.00	10,000.00
Attachment to regional laboratory	60,000.00	60,000.00	60,000.00	20,000.00	20,000.00
training of technicians	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
training of farmers	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00
Phd and post doctorate	300,000.00	300,000.00	300,000.00	300,000.00	300,000.00
Msc	100,000.00	100,000.00	100,000.00	100,000.00	100,000.00
Total Training Costs	**2,688,000.00**	**2,688,000.00**	**2,688,000.00**	**2,610,000.00**	**2,610,000.00**

OVERHEAD COSTS	FY2019	FY2020	FY2021	FY2022	FY2023
Rent	30,000.00	30,000.00	30,000.00	10,000.00	10,000.00
Electricity	12,000.00	12,000.00	12,000.00	5,000.00	5,000.00

Insurance	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
Telephone bills	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00
Internet	1,000.00	1,000.00	1,000.00	1,000.00	1,000.00
Fuel	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
reagents	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
breeding and research	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
commuication	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
Meetings	50,000.00	-	-	-	-
Total Overheads	**257,000.00**	**207,000.00**	**207,000.00**	**180,000.00**	**180,000.00**

OTHER COSTS	FY2019	FY2020	FY2021	FY2022	FY2023
Advertising	5,000.00	5,000.00	5,000.00	5,000.00	5,000.00
Consulting fees	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
Legal Services	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Database Management and early warning System	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Events and conferences:	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
GIS Services	10,000.00	10,000.00	10,000.00	10,000.00	10,000.00
Travel	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
Multiplication and dissemination of improved varieties	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
#REF!	50,000.00	50,000.00	50,000.00	50,000.00	50,000.00
surveillence	20,000.00	20,000.00	20,000.00	20,000.00	20,000.00
0	**275,000.00**	**275,000.00**	**275,000.00**	**275,000.00**	**275,000.00**

CONTINGENCY BUDGET	FY2019	FY2020	FY2021	FY2022	FY2023
Emergency fund	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00
Add Item	-	-	-	-	-
Add Item	-	-	-	-	-
Add Item	-	-	-	-	-
Add Item	-	-	-	-	-

Total Contingency Costs	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00