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BENIN PRESIDENT’S DECLARATION AT COP22

The current High-Level meeting offers a unique opportunity to define a concrete content to the historic Paris Climate Agreement. We should step forward with concrete actions in the face of the challenging climate change effect basically in preparation for COP23. Given the fact that agriculture in Africa is essentially rainfed and particularly vulnerable to climate change effect, it is now fortunate to have His Majesty King of Morocco launch the 3A initiative (Agricultural Adaptation in Africa) as an appropriate framework in this regard. Agricultural innovations coupled with technology transfer and access to climate finance should constitute the immediate actions to deploy right now. This is the reason why the Republic of Benin commits itself to establish and promote an international research center for climate change resilient agriculture ‘Centre International de Recherche pour une Agriculture Résiliente aux Changements Climatiques (CIRACC)’, a multipartner platform to be hosted at the International Institute of Tropical Agriculture (IITA-Benin), dedicated to research and training, and designed to tackle adverse effects of climate change across Africa.

H.E. Patrice Talon

INTERNATIONAL SCIENTIFIC ADVISORY PANEL CHAIR’S MESSAGE

In line with President Talon’s declaration at Marrakech COP22, IITA and its partners, under the authority of CORAF/WECARD, have initiated the establishment of a Biorisk Management Facility (BIMAF) to be the first concrete action in the overall CIRACC strategy. Whereas CIRACC will be a continental platform including all aspects of research aiming at increasing climate change resilience in agriculture, in its initial phase BIMAF will target its operations mainly in West and Central Africa, focusing on the management of biorisks through a One-Health approach. BIMAF will assume a pioneer role to enhance national and regional capacities to respond to climate change-driven biorisks. Its strategic location in Benin, West Africa, is intended to leverage climate actions-based linkages between Francophone and Anglophone countries.

Dr. Abdou Tenkouano, CORAF/WECARD Executive Director

EXECUTIVE SUMMARY

Climate change is one of the major threats to agriculture particularly affecting fragile agro-ecosystems in sub-Saharan Africa. The economic and social impact of climate change effects on agriculture is predicted to attain catastrophic levels in the coming years. Therefore, the establishment of CIRACC affords an immense opportunity to accelerate and better target efforts deployed at national, regional and international levels for implementing climate change adaptation and mitigation measures. IITA has been chosen to host the CIRACC platform on its station in Benin. Based on previous successes of managing large biocontrol and IPM projects, IITA and partners have spearheaded the initiative of establishing, within CIRACC, a Biorisk Management Facility BIMAF, which will serve as the first research arm of CIRACC under the umbrella of CORAF/WECARD. Although the priority target geographies of BIMAF will be in West and Central Africa according to the mandate of CORAF/WECARD, BIMAF will facilitate the development of multi-country projects beyond this geographic scope to fit the continental reach of CIRACC. The BIMAF Strategic Plan identifies new agricultural challenges and outlines future actions necessary to meet its priority goals. This Strategic Plan also emphasizes the need for improved collaboration and coordination with existing strategies. Not only researchers, but also the civil society, including farming communities, non-government organizations, and public and private structures should be involved to tackle the adverse effects of climate change-induced biorisks.

Dr. Nteranya Sanginga IITA Director General
**INTRODUCTION**

Climate change is defined by the United Nations Framework Convention on Climate Change (UNFCCC) as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

Adverse effects of climate change means changes in the physical environment or biota resulting from climate change which have significant deleterious effects on the composition, resilience or productivity of natural and managed ecosystems or on the operation of socio-economic systems or on human health and welfare.

Biorisks refer to both climate-driven and emerging biotic stresses such as pestiferous insect, bacteria, fungi, and virus species and their negative consequences on plant, animal, environmental and human health in agricultural systems.

One health concept is recognized as a critical approach to address societal welfare issues at the ecosystem-animal-human interface. The philosophical foundations of the current strategy rely on a plant-animal-environmental-human health approach with specific focus on plant health.

Climate-resilient agriculture means agriculture that reduces poverty and hunger in the face of climate change, improving the resources it depends on for future generations.

Climate-smart agriculture (CSA) is generally defined as co-achieving three objectives i.e. i) Sustainably increasing agricultural productivity to support equitable increases in incomes, food security and development; ii) Adapting and building resilience to climate change from the farm to national levels; and iii) Reducing or removing GHG emissions where possible.

Climatic disturbances, both in terms of deviation from long-term climate means (e.g., steadily increasing average temperature) and climate variability (e.g., shifting seasons, more frequent and extreme weather events) have dramatic and negative effects on agricultural production and productivity. Several African countries are severely affected. Africa as a whole is one of the most vulnerable continents due to its high exposure and poor adaptive capacity. Depending on the emission scenario, temperature projections over West Africa for the end of the 21st century from global climate simulation range between 3 and 6 °C. Impacts from extreme events such as floods and droughts are already evident; indirect impacts, e.g. through increased pressure from biotic stresses are less visible and often pass unnoticed until the situation becomes too difficult to handle, particularly for small-scale farmers. It is widely agreed that insect pests are amidst the major constraints that hamper crop productivity. Moreover, changes in temperature and humidity are the two most important climatic factors expected to affect insect development, reproduction and survival. Under the current climate change scenario, this will lead to i) range expansion of native pests/diseases into new geographic areas, ii) temperature-driven faster pest development leading to more frequent and overlapping pest cycles per season, and iii) increased damage potential from invasive alien species (IAS). IAS are regarded as one of the biggest threats to local and global biodiversity and ecosystem services. Accompanied by climate change, the two may become a deadly duo and cause significant and rapid changes in the composition of ecosystems. A scenario Africa is experiencing right now is the establishment of new pest species with severe economic impact, exemplified by the rapid spread of the fall army worm throughout the continent. Such spread is quite often due to lack of early warning and rapid response systems that can allow to taking appropriate actions timely enough to prevent spread of pests to new areas. There are also potential negative effects of increasing temperatures on the expression of host plant resistance, including the expression of transgenes. The impact of climate change on biodiversity linked to biotic stresses can also have a severe impact on agricultural productivity. For instance, it is speculated that climate change might influence established biological control by de-regulating natural enemy-pest interactions, because of a higher sensitivity of higher trophic levels to climatic variability or of different temperature optima compared with pests. Also, extreme climatic events may affect the ecosystem services of beneficial soil biota such as entomopathogenic micro-organisms.

Biotic stresses and mostly IAS have become a major component of climate change. They threaten biodiversity, society, human-health, well-being...
 Worldwide, and in the tropics in particular, biotic stresses are a crucial limiting factor to agricultural production. Invasive species have been estimated to cause losses in yield of eight major Africa's crops amounting to more than US$12.8 billion per annum. Crop yields of resource-poor smallholder farmers are particularly affected by the compounded effect of viral, fungal and bacterial plant pathogens, arthropod pests, nematodes, weeds and plant parasitic weeds, birds and rodents, from the farm to the market.

In the attempt to control biotic stresses, chemical pesticides are very often the first line of combat and, unfortunately, in most cases they are used incorrectly, posing significant hazards to human, environmental, and animal health. Post-harvest losses due to biotic stresses can be equally important, severely impacting on food security, livelihood and health of farming households.

**SYNERGIES WITH EXISTING STRATEGIES**
The agenda of BIMAF is consistent with CORAF/WECARD strategy on addressing sustainable agricultural productivity for West and Central Africa under a changing climate context. It also aligns very well with the ECOVAS Framework for Regional Pest and Disease Prevention, Surveillance and Mitigation designed to contribute to the realization of the food and nutrition objectives of the ECOVAS Agriculture Policy (ECOWAP 2025/RAIP-FSN 2020) under the CAADP framework (Malabo Declaration 2014). More importantly, it supports African Union Commission' priorities for sustainable development, increased agricultural production, food and nutrition security, expanded value addition and market access, and sound environmental and natural resource management implementation. CIRACC is designed to address climate change-related issues in agriculture, while relying on the expertise on biorisk management developed by IITA and partners through BIMAF.

**CREATING A STRATEGIC FRAMEWORK**
The creation of BIMAF, has been proposed by the IITA Management through the renewed strategy endorsed by the IITA Board of Trustees in 2014. However, to give it a truly regional authority and support, the creation of the Center was officially vetted by a resolution stemming from the Regional Scientific Workshop on *Biotic stresses, Climate Change and Agricultural Productivity* organized in Cotonou May 5-7, 2014 and followed by uncovering a founding plate by the Honourable Minsiter of Agriculture of Benin, together with the Chairs of the CORAF and IITA Board of Trustees.

On October 11-13, 2016, IITA hosted a second workshop titled *One-health Approach for Mitigating Climate-driven Biorisks in West Africa* at its Benin Station in Cotonou. Prior to the start of the workshop, IITA’s DG, Dr Sanginga was received by the President of Benin, His Excellency Mr Patrice Talon who gave his full support to the idea of such a platform. The workshop was attended by executives and staff from a broad range of institutions such as AfricaRice, Centre for Agriculture and Biosciences International (CABI), Centre Béninois de la Recherche Scientifique et de l’Innovation (CBRSI), French Agricultural Research Centre for International Development (CIRAD), Centre International de Recherche-Développement Sur l’Elevage en Zone Subhumide (CIRDES), West and Central African Council for Agricultural Research and Development (CORAF/WECARD), CGIAR Research Program on Climate Change Agriculture and Food Security (CCAFS), Direction Nationale de la Recherche Scientifique et de l’Innovation (DNRSI), Forum for Agricultural Research in Africa (FARA), International Centre of Insect Physiology and Ecology (icipe), Institut National des Recherches Agricoles du Bénin (INRAB), International Water Management Institute (IWMI), Université d’Abomey-Calavi (UAC), Université Nationale d’Agriculture (UNA), University of Ghana (UG), World Vegetable Center (WorldVeg), West African Science Service Center on Climate Change and Adapted Land Use (WASCAL), CGIAR Research Program on Agriculture for Nutrition and Health (A4NH), and Michigan State University/Legume Innovation Lab (MSU).

Participants showed keen interest, enthusiasm, and support for this initiative throughout the workshop, discussing mechanisms for collaboration and institutional commitment, and developed concrete ideas and concept notes, as a basis for funding that can add to and leverage on already existing initiatives and programs.

**INTENT OF THE STRATEGIC PLAN**
The intent of this Strategic Plan is to establish a coordination mechanism for BIMAF and to provide a framework for the International Scientific Advisory Panel to guide decisions on mobilizing resources and focus towards identified priorities. The strategic plan provides the roadmap for
delivering high throughput impact technologies towards mitigating the vulnerability of resource-poor farmers to the adverse effects of climate change. It is anchored on experiences and lessons learned in strengthening the building blocks of the agricultural innovations system and increasing farmer and national adaptation capacities through research, training and outreach.

**SCOPE, VISION AND MISSION**

The scope of BIMAF is to catalyse collaborative linkages between national, regional and international research and training institutions on climate smart agriculture and to foster synergies in the development and deployment of BIMAF activities in West and Central Africa.

The vision of BIMAF is to be a leading specialised Regional Reference Centre for quality research and training towards developing a climate-smart agriculture through a One-Health approach.

The mission of BIMAF is to produce knowledge and technological innovations, and to contribute to capacity building in the target countries for sustainably addressing challenges posed by biotic stresses and climate change on agricultural production.

**STRATEGIC PRIORITIES**

Through this Strategic Plan, BIMAF commits itself to achieve its Phase I goals by 2025 based on interventions in four Strategic Priority (SP) areas as summarized in Table 1 (page 6):

**Strategic priority 1: Horizon scanning and building Early Warning & Rapid Response Systems.**

The overall objective is to provide seasonal and long-term forecast and management options for biorisks affecting plants, animals, people and the environment in West and Central Africa.

Specific objectives are:

a) Data infrastructure on climate and environmental variables and biorisk characteristics

b) Prevention, surveillance, diagnostic and ICT tools at local, national and regional level.

**Strategic priority 2: Managing climate-driven biorisks.**

The overall objective is to prioritize and manage the most serious existing and emerging biorisks in agriculture.

Specific objectives are:

a) Common tool set for assessing and managing biorisks

b) Bio-pesticides and biological control agents developed and deployed against current and high risk future biotic stresses.

**Strategic priority 3: Harnessing high throughput technologies for food safety and health for mega-cities in West Africa under a climate change context.**

The overall objective is to improve food safety and health for mega-cities in West Africa under a climate change context.

Specific objectives are:

a) Climate-smart and biorisk resilient cropping systems and crop varieties

b) Enhanced human health in relation to water, soil, plant and animal health.

**Strategic priority 4: Mainstreaming biorisk management into national and regional development programs, plans and policies.**

The overall objective is to establish a platform for sharing information on climate change-related biorisks and to influence policy dialogue and advocacy.

Specific objectives are:

a) Updated regulatory framework on biorisks management

b) Strengthened capacity of national and regional bodies on the framework and on the use of biorisk management techniques

**STRATEGIC COORDINATION**

BIMAF is hosted at the International Institute of Tropical Agriculture (IITA) in Benin and has an independent International Scientific Advisory Panel (ISAP), but is under the fiduciary responsibility of the IITA Board of Trustees. BIMAF commits itself to be inclusive beyond the partners identified so far. The implementation of BIMAF strategy and activities will occur through multi-partner projects which can extend beyond West and Central Africa. IITA will facilitate the day-to-day coordination of BIMAF and proper linkage with CIRACC in Benin. Figure 1 summarizes the structure of BIMAF.

The coordination unit is facilitating the achievement of the goals of BIMAF through the following three key activities:
<table>
<thead>
<tr>
<th>Strategic goals</th>
<th>Key actions</th>
<th>Expected outcomes</th>
</tr>
</thead>
</table>
| Horizon scanning and building Early Warning & Rapid Response Systems          | • Set up a data infrastructure on climate and environmental variables and biorisk characteristics  
• Increase capacity to develop and implement risk assessment and risk analysis tools  
• Provide models with known uncertainties and validation systems on forecasting prevalence and severity of biorisks in real time and at scale  
• Set up mechanisms with stakeholders to analyze forecasted biorisks and communicate identified management options  
• Scale out diagnostic and surveillance, including ICT and public citizen science tools for forecasting and early warning, locally, nationally and at Regional level  | • Farmers use ICT tools to get and generate information on climate and biorisk data  
• Stakeholders and farmers use innovative technologies including biopesticides for pest management  
• Farmers practise climate-smart and biorisk resilient cropping systems including use of elite varieties resistant to biotic and abiotic stresses  |
**Focus on the mission**
- Keep partners focused on the key actions to implement
- Mobilize support from existing facilities/initiatives and stimulate joint projects development based on national and regional priorities
- Promote and support advocacy and policy dialogue with institutional partners at the local, regional and national levels
- Promote political dialogue and thematic exchanges to facilitate synergies and alliances with similar or complementary programs of the private entrepreneurial and public sectors
- Facilitate meetings of ISAP and other strategic events.

**Training**
- Organize training sessions on climate-smart agriculture topics for students, technicians and outreach officers
- Engage youth start-up entrepreneurs for biopesticide production and other relevant agribusiness activity
- Organize re-training of university professors towards integration of updated climate change resilient agriculture practices in curricula.

**Communication**
- Develop and validate a communication strategy
- Stimulate the production of high impact factor quality scientific papers
- Participate in meetings with stakeholders, donors and policy makers to share the strategy of BIMAF
- Link partners and ensure information sharing to farmers and farmer organisations, NGOs, private sector including youth start-up companies, and policy makers
- Prepare advocacy briefs and enable effective and informed decision-making in relation to climate change resilient agriculture.

**Figure 1.** Structure of BIMAF (the green area indicates that the hosting and implementation of BIMAF is provided by IITA-Benin). A more comprehensive organogram including CIRACC will be provided once the mechanisms governing the interactions between CIRACC and BIMAF is finalized with the Government of Benin.
## ANNEX 1: INTERNATIONAL SCIENTIFIC ADVISORY PANEL

**Chair:**
- Tenkouano, Abdou (CORAF/WECARD)

**Members:**
- Akinbamijo, Yemi (FARA)
- Adandonon, Appolinaire (UNA)
- Adegbola, Patrice (INRAB)
- Aina, Martin (MCVDD)
- Afari-Sefa, Victor (WorldVeg)
- Amoah, Philip (IWMI)
- Bahama, Jean Baptiste (FAO)
- Clottey, Victor (CABI)
- Djouaka, Rousseau (IITA)
- Fiaboe, Komi (icipe)
- Keese, Paul (University of Ghana)

**Non-voting ex-officio members:**
- Sæthre, May-Guri (IITA DDG/R4D)
- Tamò, Manuele (IITA Benin Representative)

**Secretary:**
- Tepa-Yotto, Ghislain (UNA/IITA)

This Strategic Plan was approved by the International Scientific Advisory Panel

October 3rd

2017

**Chair Signature**

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## ANNEX 2: LIST OF ACRONYMS

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<thead>
<tr>
<th>Acronym</th>
<th>Full Name</th>
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<tbody>
<tr>
<td>A4NH</td>
<td>CGIAR Research Program (CRP) on Agriculture for Nutrition and Health</td>
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<tr>
<td>AfricaRice</td>
<td>AfricaRice Centre</td>
</tr>
<tr>
<td>BIMAF</td>
<td>Biorisk Management Facility</td>
</tr>
<tr>
<td>CABI</td>
<td>Centre for Agricultural Biosciences International</td>
</tr>
<tr>
<td>CAADP</td>
<td>Comprehensive Africa Agriculture Development Programme</td>
</tr>
<tr>
<td>CBRSI</td>
<td>Centre Béninois de la Recherche Scientifique et de l’Innovation</td>
</tr>
<tr>
<td>CIRACC</td>
<td>Centre International de Recherche pour une Agriculture Résiliente aux Changements Climatiques</td>
</tr>
<tr>
<td>CIRAD</td>
<td>Centre de coopération Internationale en Recherche Agronomique pour le Développement</td>
</tr>
<tr>
<td>CIRDES</td>
<td>Conseil ouest et centre Africain pour la recherche et le développement agricoles/ West and Central African Council for Agricultural Research and Development</td>
</tr>
<tr>
<td>CORAF/WECARD</td>
<td>Forum for Agricultural Research in Africa</td>
</tr>
<tr>
<td>CCAFS</td>
<td>CGIAR Research Program (CRP) on Climate Change, Agriculture and Food Security (CCAFS)</td>
</tr>
<tr>
<td>DNRSI</td>
<td>Direction Nationale de la Recherche Scientifique et de l’Innovation</td>
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<tr>
<td>ECOWAS</td>
<td>Economic Community of West African States</td>
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<tr>
<td>FARA</td>
<td>Forum for Agricultural Research in Africa</td>
</tr>
<tr>
<td>ICIEP</td>
<td>International Centre of Insect Physiology and Ecology</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
<tr>
<td>INRAB</td>
<td>Institut National des Recherches Agricoles du Bénin</td>
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<tr>
<td>ISAP</td>
<td>International Scientific Advisory Panel</td>
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<tr>
<td>IWMI</td>
<td>International Water Management Institute</td>
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<tr>
<td>KMU/CIVA</td>
<td>Knowledge Management Unit/Centre d’Innovations Vertes pour le secteur Agro-alimentaire</td>
</tr>
<tr>
<td>MCVDD</td>
<td>Ministère du Cadre de Vie et du Développement Durable/Ministry of Environment and Sustainable Development, Benin</td>
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<tr>
<td>NIBIO</td>
<td>Norwegian Institute of Bioeconomy Research</td>
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<tr>
<td>UAC</td>
<td>Université d’Abomey-Calavi</td>
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<tr>
<td>UNA</td>
<td>Université Nationale d’Agriculture</td>
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<tr>
<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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<tr>
<td>WorldVeg</td>
<td>World Vegetable Center</td>
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<td>WASCAL</td>
<td>West African Science Service Center on Climate Change and Adapted Land Use</td>
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