SCIENCE GRANTING COUNCILS INITIATIVE SGCI IOSRS INITIATIVE DES ORGANISMES SUBVENTIONNAIRES DE LA RECHERCHE SCIENTIFIQUE

SGCI FOOTPRINTS

ENHANCING REGIONAL COOPERATION

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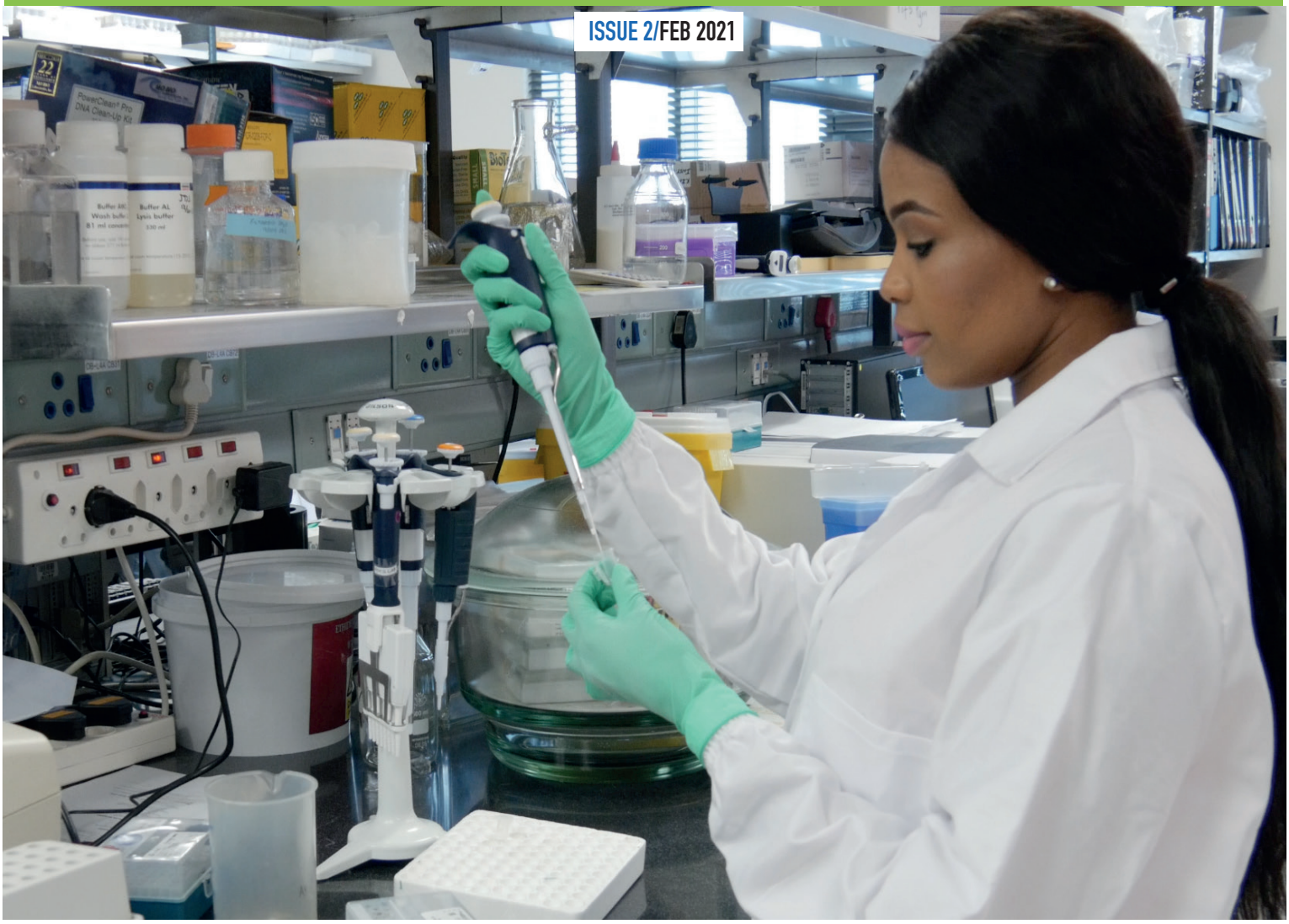

STRENGTHENING REGIONAL COOPERATION THROUGH JOINT RESEARCH AND INNOVATION

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Cover Photo - African Academy of Sciences (AAS)

ABOUT SGCI

The Science Granting Councils Initiative in sub-Saharan Africa (SGCI), aims to strengthen the capacities of science granting councils (SGC) in Sub-Saharan Africa in order to support research and evidence-based policies that will contribute to economic and social development. The objectives of this Initiative are to strengthen the ability of Science Granting Councils to: (i) manage research; (ii) design and monitor research programmes based on the use of robust science, technology and innovation (STI) indicators; (iii) support knowledge exchange with the private sector; and (iv) establish partnerships between Science Granting Councils and other science system actors.

The Initiative is jointly funded bythe United Kingdom's Foreign, Commonwealth and Development Office (FCDO), Canada's International Development Research Centre (IDRC), the Swedish International Development Cooperation Agency (SIDA), South Africa's National Research Foundation (NRF) and the German Research Foundation (DFG).

South Africa's NRF: Committed to Funding R&D in the Continent

ScienceAfrica

Dorothy Ngila, Project Specialist: Strategic Partnerships, National Research Foundation (NRF) South Africa

South Africa has entered into 23 bilateral science and technology agreements with African partners, and is a signatory and supporter of many multilateral arrangements in Science, Technology and Innovation (STI). This is among the most important policy inputs that needs to be appropriately emulated to help Africa entrench home-grown science, technology and innovation activities at the centre of Africa's socio-economic development. ScienceAfrica conducted a special interview with Dorothy Ngila, Project Specialist directing the National Research Foundation of South Africa's contribution to the Science Granting Councils Initiative in Sub-Saharan Africa (SGCI).

Q. South Africa's policy of availing research funding beyond its borders remains unique to the Continent. What informed that important decision?

The South African Government, notably the Department of Science and Innovation (DSI) through the NRF and additional science agencies in the country, has put measures in place to prioritise the country's collaborations in science, research and innovation with the rest of Africa. As of 2020, the DSI has signed a total of 23 science and technology agreements with African partners, and is a signatory and supporter of many of the continental multilateral arrangements in STI. The decision was informed by the recognition of the need to enhance the continental research enterprise, in order to support the continent's socio-economy development as espoused in Agenda 2063.

Q. When was the RSA-NRF established, and what is its core mandate?

The National Research Foundation (NRF) was established as an independent government agency, through the National Research Foundation Act (Act No 23 of 1998, as amended). Its mandate is:

a. Supporting, promoting and advancing research and human capacity development through funding and the provision of the necessary research infrastructure, in order to facilitate the creation of knowledge, innovation and development in all fields of science and technology, including humanities, social sciences and indigenous knowledge;

a. Developing, supporting and maintaining national research facilities;

b. Supporting and promoting public awareness of, and engagement with, science; and

c. Promoting the development and maintenance of the national science system and support of government priorities.

Q. How much has South Africa allocated for Research and Development (R&D) since the founding of NRF?

South Africa has the ambition to increase its Gross Expenditure on Research and Development (GERD) to 1.5%. GERD as a percentage of GDP, and is currently at 0.83% according to the recently released STI indicators report by South Africa's National Advisory Council on Innovation (NACI).

Q. How has NRF transformed R&D within South Africa?

STI is now considered a key driver for South Africa's social and economic development. There are a number of indicators showing this upward trajectory including increased national research funding commitments, increases in scientific output, collaborations and innovation activities as well as the establishment of regional organisations to drive the partnership agenda

for STI. NRF's contribution to transformation in the country includes:

a. As a premier science institution in South Africa the NRF remains committed to the continued advancement of R&D in the country. The NRF is responsible for funding approximately 16% of all postgraduates annually; a number that has steadily increased since 1998. Of importance is the consistent increase in the number of black and women postgraduates supported by the NRF to fulfil the national imperative to transform the scientific enterprise to ensure inclusivity.

b. The NRF, through its national research facilities, has consolidated and supported mission-oriented research in nuclear, environmental, aquatic biodiversity, and astronomy. This is further bolstered by specific support in areas of bio-economy, energy security, global change, and human and social dynamics, which have been part of the grand challenges set by the Department of Science and Innovation (DSI), as well as research in areas of geographic advantage; indigenous knowledge, biodiversity, Antarctic research and human palaeontology. Altogether, these investments respond to the country's national development plan (NDP 2030).

c. The NRF maintains a leading role in the country's science engagement initiatives by supporting activities and programmes that cover science education, science awareness and science communication. The organisation also continues to engage the various public stakeholders at all levels of society through these activities and programmes.

d. Of specific mention and in addition to national research facilities abovementioned, are strategic long-term investments in 15 Centres of Excellence (CoE) and over 200 national and international Research Chairs (under the flagship DSI/NRF South African Research Chairs Initiative (SARChI)), which are positioned to respond to national challenges. For example, 13 Research Chairs focus on basic education in the areas of mathematics, numeracy education, integrated studies of learning languages science; teacher education; higher education and human development; and work integrated learning. Three CoEs focus on epidemiology, HIV Prevention and Biomedical TB Research, areas that are critical to supporting the national imperative of health.

Q. How does the NRF ensure merit in awarding the grants?

The NRF awards postgraduate support and research grants guided by the following tenets: transformation, impact, excellence and sustainability. A rigorous review and evaluation process is used that specifically supports the competitive nature of grants awarded by the NRF, based on international peer review principles.

Q. How did the NRF get involved with the Science Granting Councils Initiative (SGCI) and what is its main role?

The NRF, as a premier science agency on the continent and is both a funding and implementing partner of the SGCI, emanating from longstanding partnerships with not only the core funders of the SGCI but also the majority of the SGCI participating councils. The SGCI is a strategic driver for continued strong partnerships amongst the SGCs on the continent.

Q. In your view, what has been the most significant achievements of SGCI so far?

For the NRF, this is anchored on the concept of strategic partnerships. Firstly, the SGCI has facilitated the growing visibility and profile of African science granting councils globally, primarily through the Global Research Council (GRC) and the International Science Council (ISC). Secondly, a body of knowledge and scholarship on the functioning, operations and positioning of public science granting councils has been consolidated by the SGCI, supporting the strengthening of partnerships nationally, regionally, and globally. Finally, an emerging trend of collective/multilateral collaborations has been consolidated through the SGCI, from which a critical mass of public funding agencies is represented, allowing for the building blocks of multilateral cooperation in support of Agenda 2063.

Q. From your experience, what is the status of gender inclusivity when it comes to funding STI research, capacity building and employment etc. among SGCs in Africa?

This is a dimension that is increasingly critical in terms of growing the diversity of who participates in research; considering gender and inclusivity in policy decisions of councils; and the gender and inclusivity dimensions in the research itself. Through

the engagement of the SGCI participating councils in the GRC, it's Statement of Principles and Actions Promoting the Equality and Status of Women in Research in 2016 has been endorsed and has guided some of the actions of the SGCs. Within the SGCI itself, gender and inclusivity considerations in training, curriculum design and delivery, selection of training participants and encouraging the incorporation of gender dimensions in research projects supported by SGCI have been vehicles of support. Lastly, the SGCI has been active regarding policy dialogues and special sessions dedicated to gender and inclusivity. The work on gender and inclusivity is intensifying in the next phase (SGCI-2) where there will be focus on activities to support uptake of this work within the councils and in the delivery of the initiative.

Q. Are there any links between NRF and O.R. Tambo Africa Research Chairs Initiative?

The O.R. Tambo Africa Research Chairs Initiative (ORTARChI), first announced in December 2017 and officially launched in December 2018, combines development and higher education objectives. It aims to honour a leading figure in the development of African unity, have a catalytic impact on the development of research infrastructure in recipient countries, and contribute to knowledge production and high-end skills in alignment with African Union (AU) Agenda 2063 and STISA 2024. The Initiative has established an initial 10 O.R. Tambo Africa Research Chairs in East, West and Southern African Africa, focused on research priorities identified by each host institution in conjunction with especially the SGCI in sub-Saharan Africa and the African Research Universities Alliance (ARUA) Centres of Excellence. Each Chair is applicable for one five-year term in the first instance, with a possibility of renewal subject to excellent performance and availability of funds. South Africa's NRF and the DSI, with core partners, the Oliver & Adelaide Tambo Foundation, Canada's International Development Research Centre (IDRC) and SGCI participating councils are partnering to implement the initiative. The NRF administers ORTARChI. The key objectives of the initiative are to:

a. Contribute to expanded research and innovation capacities in and for Africa, in alignment with AU Agenda 2063 and STISA 2024;

b. Attract and retain excellent researchers and scientists within Africa's higher education system;

c. Contribute to Africa's global research competitiveness while responding to the continent's socio-economic needs;

d. Contribute to Africa's career pathways for young and mid-career researchers, with a strong research, innovation and human capacity development output trajectory; and

e. Honour and promote the legacy of O.R. Tambo, emulating his values of professional excellence, integrity, inclusiveness, honesty, humility and respect for human dignity.

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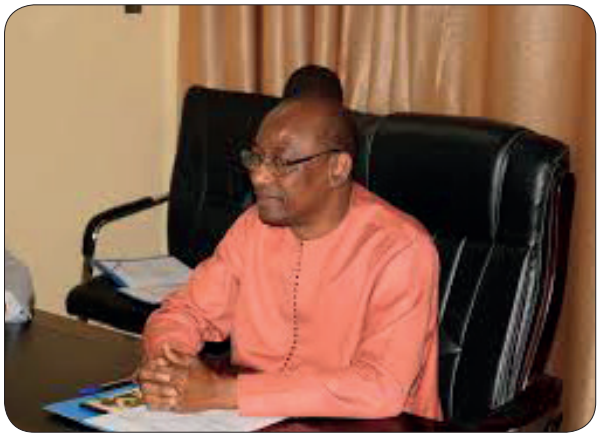
BURKINA FASO

Improving Chronic Disease Management

Paténéma Oumar Ouedraogo (Ouagadougou, Burkina Faso)



Dr Hamidou Tamboura, Director General, National Fund for Research and Innovation for Development (FONRID)

The project of the National Fund for Research and Innovation for Development (FONRID) has contributed to the reduction of mortality and morbidity of people suffering from chronic diseases. In Burkina Faso, 100 elderly people in the commune of Bobo Dioulasso benefited from this project..

Lassina Traoré, a soldier by training, had lost his taste for life since retirement about ten years ago. Chronic illnesses (diabetes, hypertension, urinary tract infection) and social dependency were the hallmarks of life for the 72-year-old father of four. He refused to leave his home because of his ailments. Thanks to the project for multisectoral management of chronic diseases in the elderly, Lassina Traoré managed to overcome these anxieties.

In Burkina Faso, the project financed by the National Fund for Research and Innovation for Development (FONRID) to the tune of USD 22,500 is being carried out in Bobo Dioulasso and piloted by a consortium of 4 structures. These are the Muraz Centre for Research, the Souro Sanou University Hospital Centre (CHUSS), the Regional Directorate for Women, National Solidarity and the Family of the Upper Basins and associations of the elderly.

The aim is to analyse the barriers to optimal multisectoral management of chronic diseases,

Paténéma Oumar Ouedraogo, Science Journalist

involving the actors most concerned, i.e. older people themselves and health and social workers. According to the coordinator of the Centre d'accueil, d'écoute et de soins (CAES) for the elderly Ouattara Lucie, the project made it possible to carry out various activities in one year, such as training on the Group Analysis Method (MAG). *"Volunteers are chosen from different associations to form a group of 15 to 20 people. Each one tells a story related to a problem in social life. The best story that has attracted attention is chosen for discussion. Together, the members of the group make proposals for solutions to the problem,"* explains Ouattara Lucie.

Many difficulties related to the care of the elderly have been identified through this MAG, according to the sociologist at the Muraz centre, Lala Sanou. These include: late recourse to health centres in case of illness, low family involvement in the prevention and management of chronic diseases, insufficient quality in the provision of health services, lack of home visits and the absence of geriatric services.

A Highly Participatory Research Method

"It is a highly participatory method of social science research and intervention that has the advantage of involving those who are usually considered respondents in the production and analysis of data. In this way, the various stakeholders were involved in the entire research process," she argues. According to her, all the elderly people involved in the project received free care on the International Day of Older Persons, celebrated every 1 October. In the same vein, the project has made it possible to get to know, for example, a large number

of services that work voluntarily with the elderly in the city of Bobo-Dioulasso.

Another advantage, according to the president of the regional council of elderly people of the Hauts-Bassins Dramane Koné, the beneficiaries of the project have established a bond of solidarity where members visit each other or call each other to find out about each other's health. *"This has given more visibility to our organization and we have registered new members. As a piece of advice, it was recommended to the elderly to avoid taking excessive medication, but rather to improve their diet,"* says Dramane Koné.

For the neurologist, head of the department of medicine at the CHUSS and coordinator of actions for the care of the elderly at the hospital, Professor Athanase Millogo, the objectives were achieved in view of the synergy of action carried out by all the stakeholders. *"The project was intended to contribute to the improvement of multisectoral management of chronic diseases of the elderly in Burkina Faso and this has produced good results. Speaking of care, it is not only about drugs, but also about facilitating the referral of patients in a concerted and privileged manner. The elderly deserve consideration,"* he says. The project in Burkina Faso was the subject of experience sharing with the participation of 4 people in a workshop in Senegal. What makes sociologist Lala Sanou say that the frank involvement of the most concerned actors and collaboration between countries that share the same realities remains the best way to solve certain health problems that are co-productions.

Legend

1. According to the sociologist at the Muraz Center, Lala Sanou, all the achievements of this project by the public services in collaboration with the associations of elderly people in the city of Bobo-Dioulasso.
2. The coordinator of the (CAES) Ouattara Lucie "The project has enabled the Ministries of Social Action, Health and various associations to act together in the care of the elderly".
3. Chronic illnesses are no longer a concern for the retired soldier Lassina Traoré.
4. The President of the Regional Council for the Elderly of the Hauts-Bassins Dramane Koné "The project must be taken up again, as demand is very high".
5. For the neurologist Professor Athanase Millogo, the training sessions have shown that care should not be limited to medical aspects.
6. The Group Analysis Method enabled the elderly to overcome many difficulties in the project.

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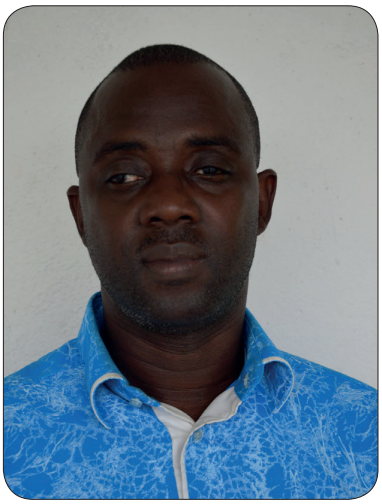
In Burkina Faso, the project financed by the National Fund for Research and Innovation for Development (FONRID) to the tune of USD 22,500 is being carried out in Bobo Dioulasso and piloted by a consortium of 4 structures. These are the Muraz Centre for Research, the Souro Sanou University Hospital Centre (CHUSS), the Regional Directorate for Women, National Solidarity and the Family of the Upper Basins and associations of the elderly.

CÔTE D'IVOIRE

Rice Cultivation: Using Drones to Improve Productivity in Côte d'Ivoire

Theodore Kouadio (Abidjan, Cote d'Ivoire)



Theodore Kouadio, Science Journalist

A group of Ivorian researchers have designed a system that uses drones to improve the productivity of rice fields in order to optimize rice production and improve the living conditions of communities in Nanan, a village in the political and administrative capital of Côte d'Ivoire.

The team of scientists led by Prof Konan-Waidhet Arthur Brice,who is also a researcher at Jean Lorougnon Guédé University in Daloa has developed a system that uses drones to improve productivity.

He explains that the drone manages the field. *"It detects less irrigated or less fertilized areas and provides the necessary quantities of water or fertilizers,"* says Prof Brice.

This work has shown how with drones, it is possible to solve the problems of irrigation and soil fertility to allow the field to have the best rice yields.

The drones not only film or carry out a visual inspection of the farms in order to identify weeds or damage, but are also equipped with various sensors that facilitate the unlimited analysis of data including levels of nitrogen, chlorophyll, biomass, humidity water and stress.

With all these information and recommendations on the necessary inputs, farmers can specifically adapt or choose the amount and type of fertilizers, pesticides, and other inputs needed by the crops.

Before the designing the system involving the use of drones in rice production in Nanan, the irrigation system for the rice-growing area failed severally in terms of hydraulic infrastructures and mastery of cultivation technics. as well as water supplies to the plots owned by rice growers.

"Rice farms took almost three times the amount of water that was needed. This challenges which the farmers faced included the quality of inputs, institutional management of the area, and disruptions linked to climate change.

These were mainly responsible for the drop in yield per hectare according to a study published in 2019 by a team of researchers including Dr Konan on the performance of irrigation schemes in the locality of Nanan.

Thus, Dr. Konan's research provided a solution to the shortcomings that have reduced the productivity of rice fields in the locality. For the cooperative society of rice producers of Yamoussoukro (Coproriz) working on this their farmland of 33 hectares, the research findings by Dr. Konan has significantly improved rice yields.

"The technics developed have allowed us to have a very good yield compared to the production we had before the launch of the project," notes the president of Coproriz, Mr. Beugré Abernaty. The Coproriz, which has been working with researchers since 2017, has 298 members including 14 women.

Narcisse Konan, another rice farmer in Nanan, explains that before the research project, he was producing just enough for his family's consumption. However, with the use of drone in rice cultivation, *"I manage to produce enough rice for my family to eat and also sell,"* he explains.

For the national authorities in charge of the rice sector, research aiming to optimize rice production at the local level is to strongly be encouraged. Indeed, due to urbanization and its rapid population increase, rice has become the main food of the Ivorian people. with an annual consumption per person estimated between 63 kg to 68.5 kg in 2009 (FAO, 2013).

According to the general manager of national office for the improvement of rice cultivation, M. Yacouba Dembele, the national production of rice is only 50 percent of what is should be.

To fill this gap, "Côte d'Ivoire spends nearly 300 billion FCFA each year to make up for the shortage", he explained. "The country therefore faces or is exposed to the risk of food insecurity. To fill this gap, the Government is taking measures towards attainment of self-sufficiency in rice production.

The Government authorities rely on the results of scientific research done to improve the productivity of rice fields. The executive secretary of the Strategic Support Program to Scientific Research (PASRES) in Côte d'Ivoire, Dr Sangaré Yaya, says economic development is linkedd to the results of the ongoing scientific research in the country.

He further added that "in Côte d'Ivoire, we must encourage the economic development driven or based on the results of scientific research, like South-East Asian countries including, South Korea and Malaysia.

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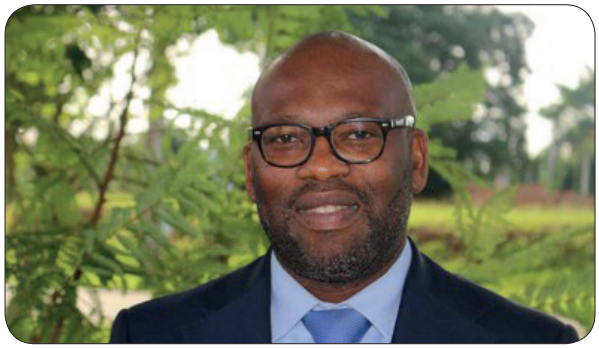
Yam Production: Ivorian and Ugandan Researchers are Pooling Their Skills to Eradicate 'Viral Diseases'

Theodore Kouadio (Abidjan, Cote d'Ivoire)



Dr Justin Pita, Executive Director, WAVE

Ivorian and Ugandan researchers are pooling their skills to eradicate " viral diseases diseases infecting yams in order to increase the production. The collaboration also includes epidemiological studies.

The study will help identify and map the viral diseases that slow down yam production in the two countries.

The research is being carried out by the West African Program for Viral Epidemiology for Food Security in Africa (WAVE) at Félix Houphouët-Boigny University in Côte d'Ivoire and the National Crops Research Institute (NaCRRI) in Uganda.

It is about *"contributing to food security in West and East Africa through a sustainable increase in yam production and a better management of yam viral diseases,"* said Dr Justin Pita, Executive Director, WAVE at the launch of the research project in June 2019.

The study was co-funded by the Strategic Support Program to the Scientific Research (PASRES) and the Uganda National Council for Science and Technology (UNCST) for a total amount of US $ 50,000.

In Côte d'Ivoire, yam is the main food crop with an annual production estimated at around 6 million tons according to the FAO (2016), or 35% of national agricultural production.

Despite this comfortable position, yam production fell short of expectations. Indeed, national yields are of the order of 7 to 12 tons per hectare and are below the potential of the plant itself.

In Côte d'Ivoire, six varieties of yams are found in the markets. These are the early maturing variety of Pkonan, Assawa and Lopka. The late maturing variety include Krenglè with one harvest, Bètè Bètè and Florido.

In Uganda, although the annual production is relatively low compared to that of Côte d'Ivoire, yams are part and parcel of the dietary habits of Ugandans. Its production in West and East Africa represents, according to the FAO, 91% of the world's production.

However, scientists explain that the yields of yam cultivation are low and unstable due to the pressure of viral diseases and insects.

"The losses caused by insects from the sowing of seeds to harvest and then during the storage of yams are significant.

Some insects are vectors of viral diseases", explains Ivorian plant pathologist, Toualy Marie Noël Yeyeh. However, these diseases remain little known in the large cultural areas of the countries.

The ongoing studies are part of the second phase of the WAVE Program. It extended its research activities to other plants with roots and tubers, namely yam and potato. Research is currently underway in the countries where the Program is implemented.

In fact, in Phase 1, particular emphasis was on cassava. This allows for a better understanding of the viral diseases of cassava. The most virulent are cassava mosaic disease and cassava brown streak disease. *"They cause severe yield losses and threaten the livelihoods of African smallholder farmers and result in an economic loss of $ 2-3 billion per year in sub-Saharan Africa,"* said a WAVE note.

Yam and cassava producer of Dimbokro, in the center of Côte d'Ivoire, Mr. Kouadio Konan Martin is hopefully

waiting for the popularization of the results of this yam research. In order to increase its annual production.

"It is the cultivation of this plant that allows me to support and educate my family of six children," he said. Kossonou Albert, a farmer in Tanda, in eastern Côte d'Ivoire, hopes that healthy yam plants or more resistant to the virus will be produced in large quantities for all small-scale yam producers.

"It will be necessary for the agricultural ministry to gets involved in order ensure that healthy or disease-free plants be available freely," he pleaded.

For the Ivorian Ministry of Agriculture, research carried out by the West African Program of Viral Epidemiology for Food Security in Africa (WAVE) is a much-appreciated support. This is aiming to prevent viral diseases of yam and cassava.

The Program supports governments and political decision-makers in formulating public policies aimed at preventing these viral diseases.

Launched in 2015 with funding from the Bill & Melinda Gates Foundation (BMGF) and the UK Department for International Development (DFID), the WAVE Program fights the spread of viruses affecting root and tuber plants.

Indeed, WAVE has developed a coordinated and harmonized strategy to control viruses that threaten the production of these plants in the countries of Central and West Africa.

In addition, WAVE Program makes research on solutions based on the knowledge and proficiency of local experts. Thus, the Program adopted an innovative approach associating thirteen (13) National Agricultural Research Systems (NARS) in Central and West Africa for a coordinated and effective fight against viral diseases of root and tuber plants.

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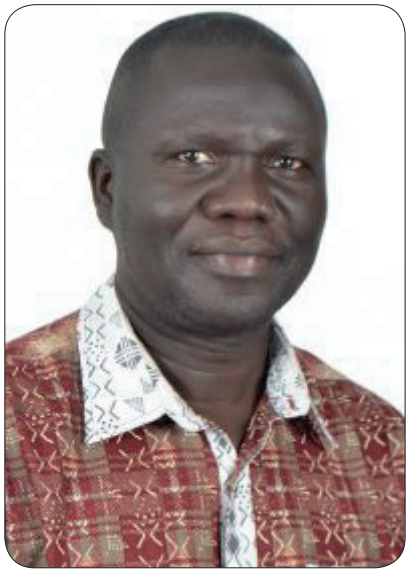
CÔTE D'IVOIRE & UGANDA

Food Security: Virus Study to Support Production of African Yam Variety in Uganda and Cote d'Ivoire

Jacky Achan (Kampala, Uganda)



Dr Titus Alicia, Head of the Root Crops Program, NaCRRI

Yam is a very important crop in the tropical world including Latin America, parts of Asia and Africa. Central and West Africa are the major yam growers in Africa where it is one of the major staple crops.

"It has a high economic value than most of the staple crops. If you put maize, rice and sorghum together, yam's economic value is more than these crops combined," says Dr. Titus Alicai, a plant virologist and Head of the Root Crops Program, at the National Crop Resources Research Institute (NaCRRI), which is under the Uganda National Agricultural Research Organisation (NARO).

"However, the yam is a neglected crop, there is no strong intervention from research and production. There have not been strong investments in yam in Uganda to develop it to the extent that it can be used as a major commodity in the country," reveals Dr. Alicai.

"We refer to yam as an orphan crop because there is very little attention given to it from research to production," he further states.

But that will soon change following the epidemiological study of yam virus diseases in Côte d'Ivoire in West Africa, and Uganda, in East Africa, that seeks to understand how viruses affect the African yam, to improve its variety and scale up production.

Yam Virus

According to Dr. Alicai who was the co-investigator in the study, both in West and East Africa, one of the major constraints affecting yam production is viruses.

"We have several viruses that are known to infect yams. Globally there are six major viruses affecting yams. Four of those have been reported in Africa. When viruses affect the yam, the yield is significantly reduced. The plants get deformed or don't form at all, or the tubers shrink, so up to 50% of the yield is lost due to viruses," he says.

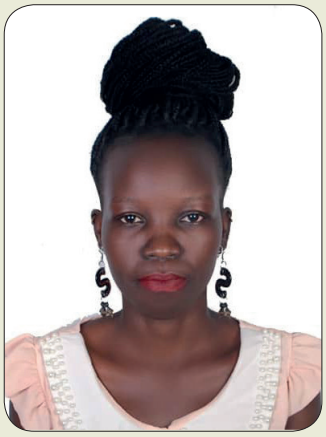
"The other impact of viruses on the yam is on the quality of the planting material. Commonly farmers use the tuber by cutting a piece of it and planting, or cutting a piece of the vine and planting a new crop. But if the plant is affected by viruses, it means the tuber and the vine equally have the virus," he adds.

Dr. Alicai says the quality of the planting material is poor and it subsequently affects the yield, making access to quality planting material a major issue.

He says the study on the epidemiology of yam virus diseases sought to have a good understanding of the viruses that affect the African yam so that it becomes a basis for controlling the disease.

"We sought to know how yam virus spreads, how it is distributed around the country, how common it is, its incidence and prevalence, and its severity. In addition, we sought to determine the diversity of the viruses."

Dr. Alicai says on seeing African yam affected by viruses they also sought the identity of that virus, *"how does it compare with other viruses known in other places? How diverse are the viruses? Is it one group of viruses or there are many groups or types of viruses? and within each of those is a sub type of which we call strains. We*



Jacky Achan, Science Journalist

wanted to understand all of that," he says.

"The study was successful. Collection of isolates was done, laboratory processing of isolates was successfully done, it is only the analysis that is yet to be done," says Jacinta Akol a researcher at NaCRRI.

"We were supposed to send the ready samples for sequencing, if it wasn't for the lockdown, we would have concluded everything. Nonetheless the study was a success we have the results and at least a clue of the yam virus effect. The details are what we are yet to get from the sequencing process," she says

According to Dr. Alicai, *"if you know the virus, including how it spreads, and what kind of impact it has on yield, then you can begin to devise measures to control it. For as long as you control the virus it means you can improve production of the yam."*

How The Yam Virus has Affected Uganda

From our survey of yam growing fields, in 49 districts around Uganda covering six sub regions, we assessed 183 farmers' fields, looked at the plants, and recorded whether they have symptoms or not. We also picked samples, brought them to the laboratory and analysed, says Dr. Alicai.

"We found that yam disease prevalence is high! In Uganda. It is at 49% which means roughly half of the fields we visited had yam virus disease," he reveals.

In 15 districts out of the 49 surveyed, there was a 100% prevalence of yam virus disease. "You step in the district, assess a number of fields and all of them have yam virus disease," says Dr. Alicai.

The 15 districts represent about 31% of the districts surveyed with 100% yam virus prevalence. It's only in 13 districts out of 49, that no case of yam virus disease was recorded.

The remaining 21 districts out of 49, had moderate to high prevalence of the yam virus disease which is in the range of 20% to 50%.

According to the incidence of the study, which aimed to see how many plants had the disease in each field in a district so as to have an average for the area. The highest rate of yam virus disease was in Central Uganda districts including Kayunga, Mukono and Nakasongola.

In the East there was Kween, and Sironko, whereas in the North was Pader. The districts had more than 60% incidence. According to Dr. Alicai, the yam virus is widespread in Uganda.

The Importance of Yam When it Comes to Food Security

It has a very long life on harvest and can be stored for more than six months without it getting spoiled compared to other staple root and tuber crops. like cassava, sweet potatoes and Irish potatoes, which on harvest have to be processed immediately or eaten, discloses Dr. Alicai.

He says the yam because of its long life upon harvest, has a very good value for food security, and also nutritionally it is better than most staple crops. Most staple crops are rich in carbohydrates but the yam has a good level of other food nutrients including proteins and vitamins.

"It's an important crop for food, nutrition and income security. We are looking at improving yam production by trying to understand the viruses, how they spread, their diversity and their control," says Dr. Alicai.

Akol adds: *"The yam is an important food crop for most households in Uganda whether rural or urban. It is a frequent meal, and the food to go to when in need to feed the family, amid food scarcity."*

She says it is food that's always available in a household, provides food security and can equally generate income.

"In West Africa for example yam trade is big and women are so involved. Right from selling the planting materials, selling the fresh tubers, they process it into other products that can be used to make other value added products, and it's tradable," adds Dr.Alicai.

In 2017, worldwide production of yams was 73.0 million tonnes, led by Nigeria with 66% of the global total, according to the Food and Agriculture Organization.

Nigeria farmed yams on 5.9 million hectares, 70% of the world land area of 8.6 million hectares devoted to yam farming.

The world average annual yield of yams was 8.8 tonnes per hectare in 2017, with Ethiopia having the most productive farms of 29.2 tonnes per hectare.

The Status of Yam Growing in Uganda and Challenges Faced

In East Africa, yam doesn't have that kind of status, and importance it's given, for example, in West Africa. In Uganda, we don't grow yam (African yam) as much, although all around the country you find farmers growing it.

While food crops like cassava and maize will be grown for income generation, and go through value addition for commercialization, the yam has not been improved in any way and is mostly harvested for home consumption, explains Akol.

She says produced on a small scale the African yam is mostly consumed at home in central Uganda and sold in nearby markets.

However, farmers in Northern Uganda and West Nile regions mostly export yam to DR Congo and South Sudan. *"The African yam has a market across borders,"* states Akol.

"It's harvested at the beginning of the year in West Nile and Northern Uganda and exported to South Sudan and the DR Congo market. It's an expensive crop because it's limited in production and not many farmers have adopted it," she says.

The African yam also has medicinal benefits and it's a food encouraged for people with diabetes. *"It boosts immunity and reduces the level of disease attack, and has several other food nutrients. It's encouraged for consumption to boost immunity,"* says Akol.

The African yam looks like the Nigerian yam or cassava, but hairy and some are prickly, but in Uganda the African yam does not have straight tubers like cassava because not much study has been put into improving it.

Hence it also draws names like the elephant foot yam or elephant yam because of its shape. In Central Uganda it is locally referred to by some people as Balugu or Ndaggu a variety of yam.

Unfortunately over time, cultivation has gradually been abandoned in favor of more productive plants like sweet potatoes and maize, says Dr. Alicai.

"Our interest is to create more awareness about the importance of the yam, promote it and do more research on it to produce more varieties and address all issues. It's an important crop for the country to have as one of its major crops," he says.

Not to be mistaken for cocoyam that most people in Uganda refer to as yam, African yam is grown on a small scale in several districts across Uganda including Kayunga, Mukono, Sironko, Nakasongola, Pader, Adjumani.

However, the problem now is that they are growing some of the very old varieties that have been passed down for generations which means productivity is low and poor, says Dr. Alicai.

The Solution

We need strategic intervention for the yam in Uganda, a framework is important, it will allow us to build research on the yam, stated Dr. Alicai.

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The African yam looks like the Nigerian yam or cassava, but hairy and some are prickly, but in Uganda the African yam does not have straight tubers like cassava because not much study has been put into improving it. Hence it also draws names like the elephant foot yam or elephant yam because of its shape. In Central Uganda it is locally referred to by some people as Balugu or Ndaggu a variety of yam.

He says in other parts of the world especially West-Africa research and work on yam is quite advanced. *"Instead of our farmers growing these old varieties which are past their sell by date, we can access improved varieties of African yam, introduce them, evaluate and promote them,"* he says.

Dr. Alicai says Uganda needs to build a clean seed system. *"Why the virus is prevalent in Uganda is because farmers are replanting already infected yam. Farmers just pick the yam tubers or vine from their garden and replant, but it's already sick, it has not been cleaned,"* he says.

"If we have a clean seed system it means that for those good varieties that have been identified, they can be brought back into our research laboratories, and cleaned. Those viruses can be eliminated from the yam and then the virus free material can be multiplied and availed to farmers so that whatever they are planting does not have the virus," he adds.

In addition some of the farmers can start a business as yam seed producers and their seed will be virus free, according to Dr. Alicai

He however says in the long term there is need to go into breeding (research that will develop yam varieties that are resistant to viruses) but it will need funding. *"We need to put money in yam,"* he says.

The six months study on the epidemiological aspects of yam virus diseases was funded by the Uganda National Council for Science and Technology (UNCST) under the Science Granting Councils Initiative (SGCI) a multi-funder initiative to the tune of $50,000 on shared budget of which Uganda contributed $13,000.

Through the study it was found that five different species of yam are being grown in Uganda. Globally there are about 300 yam species and in Africa there are 10 dominant species, and Uganda has five of those grown by farmers.

"We collected the different species, we are trying to conserve them and multiply them and do other studies later on to further improve the yam variety," says Dr. Alicai.

What more needs to be done?

We are still working to know exactly which viruses of the four found in Africa are present in the yams in Uganda, says Dr. Alicai.

He says what they found in the study is based on the yam virus symptoms observed. Just like Akol, he explains that the samples were collected from the field, brought to the laboratory but have not yet been analyzed.

"We would have completed the process by now but, because of the lockdown to slow the spread of the coronavirus (COVID-19) pandemic in Uganda, we are behind with this plan because we had to order for the testing kits which takes a while, and you find several months have gone," states Dr. Alicai.

He says with hindrances like the lockdown, six months for the project is a short time but at least they have the samples for further study.

"What is pending in the laboratory doesn't involve much, kits were already ordered for, and when they arrive it's a matter of doing analysis of the samples. We are here to complete the work and share the findings through publication," he says.

Dr. Alicai emphasized there is need to conduct more research on virus aspects, and build yam seed system.

He however says when it comes to capacity there are few people who know about the yam, *"we need the community, farmers, policy makers and traders to know that yam has potential for food security and business,"* says Dr. Alicai.

Under the yam virus study project, the collaboration with Université Félix Houphouët-Boigny (UFHB) the largest in Côte d'Ivoire is now paying off.

Dr Alicai says it is an Institution and country where research on yam is advanced and the collaboration is important for the change wanted to progress yam growing in Uganda.

But importantly the collaboration has helped Uganda to start building its own yam research. As a result of the collaboration and the findings, Uganda got a PhD student from Ghana who is now based in Uganda, and tasked to conduct studies on yam varieties currently grown in Uganda, to understand their performance in comparison to other varieties grown elsewhere.

Dr. Alicai says they have accessed some germplasm (other varieties) from West Africa which are now being evaluated alongside varieties collected during the survey.

"Hopefully out of the study, we shall identify some superior varieties, which can be taken forward but the effort needs to be supported. We have started the journey, more needs to be done to promote yam production," he says.

KENYA

EASTECO's Project Focusing on Locust-based Food and Feed Industry

Nuru Ahmed (Nairobi, Kenya)

Prof Joshua Ogendo, Egerton University

Scientists are developing new technique for locust mass culture for food and feeds industry in East Africa". This a regional project was an initiative of the East African Science and Technology Commission (EASTECO).

It involves scientists from Egerton University, Sagla Parks in Homa Bay, International Centre of Insect Physiology and Ecology (ICIPE) in Kenya; Makerere University in Uganda, University of Rwanda and Sokoine University of Agriculture in Tanzania.

The Lead Scientist, Prof. Joshua Ogendo of Egerton University, says that the project was conceptualized to address the biting shortage of protein-rich supplies for feed formulations in the East African Community region.

If pursued to its logical conclusion, the project is set to offer desert locust as a suitable alternative to the Silver Fish from Lake Victoria. Stocks of the fish- known as Omena in Kenya, Dagaa in Tanzania and Mukene in Uganda- have continued to dwindle over the years owing to pollution, illegal fishing methods and many other problems associated with the lake.

According to Prof Ogendo "the lake is unable to produce enough Dagaa to sustain the livestock feed industry. There is already competition between human beings and livestock for the fish.

However, there is need to develop diverse or new sources of proteins to sustain the livestock feed industry and as a base for fortified food products."

Nuru Ahmed, Science Journalist

Prof Ogendo emphasizes that Locusts are insects considered to be "meat of the future" because they reproduce very fast, have high quality meat, very efficient in food conversion, water and land utilization. One needs less water, land and food materials to rear locusts. They also have low carbon footprints compared to livestock since they have very low greenhouse gas emissions. "

Based on the fact that locusts are the 'meat of the future,' Egerton University in collaboration with partners in EAC region is developing locust-based food and feed products with a view to solving the problem of livestock feed shortages and inadequate proteins. *"East Africa is largely a livestock feed deficient region and hence any initiative that develops new ways/methods to secure feed supplies from locusts is a timely intervention,"* Prof Ogendo said during the interview.

He said that the project is expected to contribute towards food and feed security and wealth creation in the East African region through mass rearing of locusts and development of locust-based value added products.

Prof Ogendo further noted that the project is addressing five main objectives, namely:

- To develop a prototype for mass rearing using scientific processes to determine the biological efficiency of the technology;
- To prospect for locust-based value-added food and feed products including how locust formulations will influence what we eat and the feed industries.

- To determine the risk, if any, of zoonosis in the new locust mass rearing technology especially animal diseases.
- To determine the levels of Greenhouse Gas (GHG) emissions from the new technique for locust mass rearing and hence likelihood of posing threat to the environment.
- To build capacity of scientists in the East African Community region in insect science for food and feed industries.

Prof Ogendo added that, although ambitious, the project received USD 80,000 for a period of one year to cover the activities by the four main partners (Egerton University, Makerere University, Sokoine University of Agriculture and the University of Rwanda).

It was funded by EASTECO through the Science Granting Council Initiative (SGCI) phase 1 which closed on 31 December of 2019. It our plea that EASTECO, through SGCI phase 2 consider funding this noble project to its logical conclusion, Prof Ogendo said.

The Lead Scientist stated that they are still continuing with the R&D activities including assembling a mini-mass rearing equipment for locusts at lab-scale. This effort is being led by Dr. Evance Obura at Egerton University in Njoro, Nakuru. Other equipment for mass rearing are at Sagla Parks in Homa Bay County.

The project team's innovations and achievements include;

- Egerton University, in collaboration with Sagla Parks, has successfully prototyped and fabricated the RoofPark Greenhouse Technology (RPGT) for locust mass rearing and now seeking Intellectual Property or Patent protection for the innovation.
- Preliminary studies on biological efficiency of RPGT system for the locust mass rearing has given promising results and optimization is ongoing at Egerton University and Sagla Park in Homa Bay County.
- The Greenhouse Gas (GHG) emission studies have been conducted jointly by University of Rwanda and ICIPE. The results are currently being analysed and will be finally be shared.
- The value addition studies carried out by Makerere University have revealed that the desert locust can be a source of good quality chitosan, a product which can be incorporated in quality food products.
- The project, through the University of Rwanda and ICIPE, has trained one scientist at master's level and four research assistants across the EAC partner institutions on insect science with special focus on locust production.

> “Based on the fact that locusts are the 'meat of the future,' Egerton University in collaboration with partners in EAC region is developing locust-based food and feed products with a view to solving the problem of livestock feed shortages and inadequate proteins. “East Africa is largely a livestock feed deficient region and hence any initiative that develops new ways/methods to secure feed supplies from locusts is a timely intervention," Prof Ogendo said during the interview.

- Establishment and development of a field extension point at Sagla Park in Homa Bay County.

- The project has also identified common beans, Phaleolus vulgaris, as a suitable plant diet for locust rearing. The study showed that locusts fed on this plant diet, take a short developmental period to maturity. However, there is an urgent need to focus on non-food plants or products as diet for locust rearing to avoid direct completion with human beings for food and

- Finally, the project successfully involved the farmers, community and other target beneficiaries of this Initiative.

Lessons

Over the project period, the scientists learnt many lessons. First, they acknowledge that coming up with innovations is time- and resource-intensive process. Dr. Obura particularly singled out "Prototyping and Fabrication of the RPGT" as being expensive and requires additional resources for optimization of its biological efficiency.

Secondly, the scientists at Egerton University said, "one year" was not enough to implement and complete a project with five objectives and being implemented in four EAC countries. They added that some of the partners depended on successful implementation of objectives assigned to other partners before embarking on their components.

Prof Ogendo lauded the regional approach by SGCI as an excellent Initiative adding that "if it can be institutionalized and grants awarded for 2-3 years, it could be a platform that allows the region to have an industrial take off and integration of science, he suggested.

The scientists strongly believe that technology is likely to form part of the way forward in harnessing locusts for food and feed industry in East Africa. They acknowledged that there is room for innovative approach to procurement help ensure timely implementation of projects with short duration. This was even more difficult where graduate students were on board.

The locust menace witnessed in Eastern Horn of Africa in 2020 can be effectively managed through mass trapping technologies and using locusts as raw materials for animal feed formulations. Once the locust-based feed formulations are accepted by the feed industry, it will spur investment in mass harvesting technology and take care of future invasions. The process needs to be facilitated with resources so that technology like what we are using for mass rearing can also be used for mass harvesting.

Prof Ogendo stated that the way forward is to promote the production, processing and distribution of locust-based products with the ultimate aim of having such products in the formal markets such as the supermarkets and agro-input stores. It also includes efforts aimed at the standardization of locust-based food and feed products including targeting the Arab world with "halal" foods.

Prof Ogendo noted that basic "human, technical, financial and infrastructural capacities have to be enhanced for insect and related sciences to keep pace with technology advancements and societal needs. There should be investment in the latest technology that allows the locust-based innovation pathway to proceed smoothly.

This should be completed with targeted engagement of livestock feed companies to take up the raw materials for processing locust based products. Farmers should also be engaged so that they adopt locust farming for food and feed industries to boost the level of proteins in the East African region.

As we conclude, in phase two, the project should be given an opportunity to continue with pending research agenda and proceed to engage food and feed industries to consider processing locust-based products for human consumption and as livestock feeds. These efforts should be augmented with further research focusing on the presence of any allergens in locust-based products.

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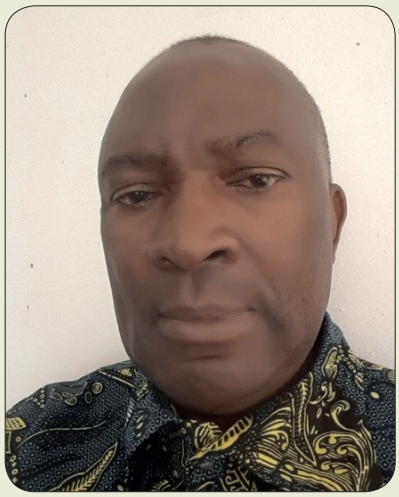
> ... the project successfully involved the farmers, community and other target beneficiaries ...

RWANDA

Innovation Boosting Pharmaceutical Manufacturing in East Africa

Aimable Twahirwa (Kigali, Rwanda)



Prof. Justin Ntokamunda Kadima, University of Rwanda

Scientists are poised to help countries in the East African region expand their pharmaceutical industries. They are developing innovative products that are technologically demanding in relation to the economic context of low-income countries.

Thanks to project implemented as part of the five-year Initiative to strengthen the capacities of Science Granting Councils (SGCs) in sub-Saharan Africa to support research and evidence, research institutions and scientists have been supported to conduct bioequivalence studies for generic medicines.

During the implementation phase of this new research, bioequivalence studies were conducted specifically to address current challenges faced by pharmaceutical manufacturers across the region with constant competitive and regulatory pressure to upgrade their technological capabilities.

"Most of countries do not have the capacity to conduct bioequivalence studies for generic medicines, so the quality of most locally produced generic medicines is not fully established," said Prof. Justin Ntokamunda Kadima referring to the situation in East African region.

Kadima is the Lead-Researcher from the Department of Clinical Pharmacology, School of Medicine and Pharmacy at University of Rwanda.

Mainstreaming STI in pharmaceutical industry

Although there is increasing evidence indicating that the appropriate capacity to practically conduct bioequivalence studies for generic medicines across the region seem to have hindered some countries from sustaining these efforts.

While some initiatives are emerging in Uganda and Tanzania, Rwanda and Burundi are in the design phase.

In East Africa, researchers say the characteristics of local drug production are still shaped by each country's economic and industrial systems, which in turn are the product of their economic and policy to mainstreaming Science Technology and Innovation (STI) as one of the key agendas for socio-economic development

They also indicate that pharmaceutical manufacturers face constant competitive and regulatory pressure to upgrade their technological capabilities.

The evolving analytical framework emphasizes the extent to which this upgrade is based on both investment at the enterprise level by building on existing capabilities, as well as the benefits that flow from its basic surrounding industrial environment.

Reducing donor-funded purchases

Initial studies for generic medicines conducted by a team of researchers from the University of Rwanda found that the catalytic properties of the purified enzymes used in the designing of drugs such as the antibiotic amoxicillin capsules and captopril tablets can serve as catalyst for capacity building and the subsequent introduction of bioequivalence studies in East African Community (EAC) member states

This is because the quality of most locally produced generic medicines is not fully established across the region, Prof. Kadima tsaid in an exclusive interview.

One of the reasons justifying this phenomenon is related to the fact that local pharmaceutical industries

have been for long deprived of massive business opportunities through donor-funded purchases, he said.

According to him, reliance on donor funds such as the Global Fund to Fight HIV / AIDS, Malaria, and Tuberculosis is clearly not sustainable in the long term when considering that there are many diseases for which local pharmaceuticals in the region are key treatments and for which access to quality medicines is much less advanced.

During the implementation phase, the project has focused on conducting bioequivalence studies to establish links between amoxicillin capsules and captopril tablets, which showed good clinical efficacy to treat a wide variety of bacterial infections in East African region.

"It was a prospective exploratory project aimed at identifying strengths, weaknesses, and opportunities for local pharmaceutical industry," the Rwandan pharmacists said.

Across East African region, researchers describe pharmaceutical as the core of national healthcare sectors as it serves as one of the most important manufacturing industries.

However, experts note that pharmaceutical manufacturers still face constant competitive and regulatory pressure to upgrade their technological capabilities.

"The evolving analytical framework emphasizes the extent to which this upgrade is based on both investment at the enterprise level by building on existing capabilities, as well as the benefits that flow from its basic surrounding industrial environment," Prof. Kadima said.

Kadima acknowledged that the quality of most locally produced generic medicine across East African region also deprives local pharmaceutical industries of massive business opportunities through donor-funded purchases.

Benefits of locally manufactured drugs

During various workshops and conferences organized by the United Nations Conference on Trade and Development (UNCTAD), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and the Secretariat of the East African Community (EAC), pharmaceutical scientists emphasized the importance to promote coherence of local pharmaceutical production policies and other means of improving access to medicines and medical products in the East African Community and beyond.

Other suggested measures include setting of common external program tariff and protocol of the common market, human capacity building and foreign investment, it said.

Among other major public health, impacts in the use of locally manufactured drugs for therapeutic purposes include the pricing of locally produced products that governments and people could afford and the uninterrupted supply of essential medicines, according to researchers.

"There is also a need to promote the innovation for the development of formulations that is more suitable for local conditions," Prof. Kadima said.

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Locusts Ideal for Food Industry, Value Addition

Aimable Twahirwa (Kigali, Rwanda)

Dr. Didace Ndahimana, University of Rwanda

In a move to promote relevant new technologies with the aim to strengthen food security, a team of researchers from Kenya, Rwanda, Tanzania and Uganda have jointly developed an innovative technique of exploiting locust masses as possible sources of human food or feed for livestock production.

With the total cost of $ 80,514 USD allocated during the implementation phase, researchers have developed a ground-breaking tool using Roof Park Greenhouses (RPGs) technique to conduct experimental feeding studies with locusts on the use of feed mixtures composed of storable feed materials commonly used in livestock production.

The project was part of a five-year, US$15 million initiative launched in 2015 to help Science Granting Councils (SGC) in 12 African nations.

Roof Park Greenhouses

Based on the investigation, the research team from four academic institutions namely Egerton University (Kenya), the College of Agriculture, Animal Science and Veterinary (CAVM) of the University of Rwanda, University of Makerere (Uganda) and Sokoine University of Agriculture (Tanzania) found that the new type of greenhouse kit provide a stable, controlled environment for locust mass-rearing.

It has long been a challenge for researchers to conduct experimental feeding studies with locusts using traditional laboratory practices until they come up with new greenhouse approach that allowed them to start extracting chitosan, a type of fiber taken from the exoskeleton of insects and which is mainly used for food processing industry and pharmaceutical production.

Aimable Twahirwa, Science Journalist

Chitosan has also a number of commercial and possible biomedical uses. In medicine, it is useful in bandages to reduce bleeding and as an anti-bacterial agent, it said. As the existing mass-rearing protocols are based on fresh, non-storable feed materials, the study was the first to explore the possibility of having a system out of the laboratory environment, said Dr. Didace Ndahimana, referring to the situation in Rwanda.

Dr Ndahimana is a senior researcher at the College of Agriculture, Animal Sciences and Veterinary Medicine, of the University of Rwanda.

Edible food resources

To further assess the impact of locusts on food security, Agriculture and food researchers from various academic institutions across East African Community (EAC) have focused on the system development and analyzing its efficiency and the risk of zoonosis which may result in the transmission of the disease at the human-insect interface.

"Insects such as locusts are considered edible food resources with sufficient nutrients for both human and animals, but their nutrient composition and safety evaluation are key," Dr Ndahimana told 'Science Africa' in an exclusive interview.

Insects as food and feed, in particular as a new and sustainable source of high-quality protein, have been attracting the attention to food science across East Africa where researchers have started to conduct trials of locust products value addition.

"The significance of the discovery is that a system for the measurement of greenhouses gases emitted during insect rearing has been developed, and setting is underway to conduct measurements" said Ndahimana who is also a senior lecturer in Food and Nutrition at the University of Rwanda

Research collaboration

In the initial experiment, it has also been discovered that locusts convert high protein diets very efficiently into body mass, yet certain diet formulations revealed nutritional limitations.

Commenting on the findings, the senior Rwandan researchers also stressed that it would be helpful if the project gets a second phase funding so that the locust mass rearing system prototyping can be completed to the model deliverable to food and feed industries.

Thanks to the collaboration between Egerton University of Kenya and its associated private company SAGALA Parks, the smart greenhouse monitoring system has been tested where it is currently being optimized to be used for business purpose.

Most of the collaborations between different academic institutions under the new research project focusing on locust mass rearing, a number of junior researchers from each country have been granted scholarship to pursue their Master's degree on specific clusters of the project.

"When the Rwandan student will return back home after completing learning in assessing greenhouse emissions of mass locust thanks to this collaboration, the country will get benefit from this expertise," Dr Ndahimana said.

For months, locust stretching tens of kilometres in length and breadth has blighted central and eastern Africa. Now the new research collaboration seeks to explore nutritious benefits that these insects may contribute to food security across the region.

In its latest update released in March this year, the Food and Agriculture Organization (FAO) of the United Nations aid the threat from locusts currently remains high in East Africa.

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TANZANIA

Destructive Locusts: Every Cloud has Silver Lining

Deodatus Mfugale (Dar es Salaam, Tanzania)

Deodatus Mfugale, Science Journalist

Large swarms of desert locusts have wreaked havoc in East Africa countries since they were sighted in late 2019 in various places. The insects which had invaded at least 15 counties in Kenya and reached Tanzania, Uganda and Somalia by February this year, pose additional danger to the fragile food security situation in African countries. Communities that have been invaded by swarms of locusts are using whatever means is available to protect their livelihoods.

Countries have also employed various measures in order to control and prevent further damage. The economic impact of locust attacks need not be overemphasized. The amount of money needed to buy food supplies for the victims of hunger and to prevent further destruction is outrageous, throwing the burden beyond the immediate victims onto countries and the international community in general.

Records indicate that an outbreak in West Africa in 2004 required USD122 million to control it besides the loss suffered from the destruction. More recently, in 2013, about 60 per cent of Madagascar was affected by locusts, as a result of which around 2.3 million acres of farmland had to be sprayed with pesticides.

The situation was put under control after three years with efforts from the government, the Food and Agricultural Organisation (FAO) and various stakeholders from the international community.

However, besides the destruction, locusts can be an alternative source of food for human beings and feed for livestock given their availability in large scale. Scientists and researchers are now working on the possibility of building sustainable businesses in the production of food and feed from locusts.

This would not only reduce food losses suffered by communities but it would also conserve natural vegetation. Although locusts are a good source of nutrition their importance and potential for human consumption is largely unrecognized in Africa. It is for this reason that SGC through its SGCI is conducting research to find the possibility of large-scale use of locusts as human food and livestock feed.

Locusts are rich in protein and so can be an important component of the human diet. They can also provide a valuable ingredient in the manufacture of protein-rich feed for fish and livestock such as poultry, pigs, pets and other domestic animals.

Godwin Meghji is a poultry farmer in Dodoma City in Tanzania. He has 12,000 chicken, all layers and prepares his own chicken feed using various ingredients including maize, soya and fishmeal. He welcomes the idea of using locusts as chicken feed, *"But we need to know more about the nutrients in locusts. Of course, there is plenty of protein in these insects but I believe there are other nutrients,"* said Meghji.

He also raised concern on the sustained availability of locusts as the insects appear seasonally. This means there might come a time when feed producers will have to change to other types of chicken feed or change the ingredients. *"Chicken are very sensitive to change in their feed; a slight change may lead to reduced agg production or slow growth.*

We must therefore be assured of constant supply of locusts in order to make it the sole feed of one of the ingredients of chicken feed," he said, adding that there must also be high-quality control in the preparation of locusts if they are to be used as chicken feed. *"Collection of locusts, processing, packaging, storage and distribution, all these must be done under strict quality*

control otherwise chicken and consumers of eggs and chicken could be affected," said Meghji.

Emmanuel Kihaule runs a poultry farm of 600 chicken in Dar es Salaam. He says he would certainly use chicken feed made from locusts particularly if the price of the goods would be lower than that of conventional feeds.

"The major cost component of poultry farming is in feeds, so if there is a new product that would reduce costs that I will definitely use it. It is also important to find out if the new product has no side-effects on chicken and is not a threat to the health of consumers," he says.

Kihaule also underlined the need for sustainable supply of chicken feed bearing in mind that many poultry farmers might switch to this type of feed, thereby overwhelming the supply chain. "Locusts appear occasionally, so what how will manufacturers guarantee supply when the insects are not available?" he asked.

Go Insect is a company based in Dar es Salaam that produces larva which is used in livestock feed. The larva may be used as sole feed or mixed with other ingredients to produce feed for chicken, fish and pigs.

"We don't know much about locusts and their use as chicken feed but my concern would be on availability since the insects are seasonal. Again, livestock especially chicken (not free range) always prefer to have the same type of feed and change might affect their growth," said Charles Isaac, Executive Director of the company.

He explained that it is easy to make feed from insects like crickets because they are easily available or they are easy to breed. *"I think livestock keepers need more information on locusts before we use them as feed,"* he adds.

A publication by FAO in 2013 demonstrated the importance of insects as sources of edible protein in many cultures in Africa and Asia. The insects are a highly nutritious and healthy food source with high fat, protein, vitamin, fibre and mineral content.

There is evidence that insect-based feeds are comparable with fishmeal and soy-based feed formulae and according to Food Tank, locusts are superior to beef as the insects have 72 per cent protein, including essential amino acids. They also contain Omega-3, iron, zinc, Vitamin C, folic acid, B12 and chitin, without cholesterol or saturated fat, antibiotics and hormones. Protein in locust meals exceed fish meal and reduces costs substantially.

However, establishing locust food and feed businesses can face many challenges. One is that swarms of the insects could be available in one area and there could be none in others thus requiring balancing oversupply and over-demand.

Perhaps food industries could come in at this juncture by engaging in wild harvesting and mass production. Elaborate marketing and distribution systems would ensure that the products could be accessed by many people and whenever the need arises. The problem is that wild harvesting of locusts for food and feed can only be done where pesticides are not used to kill the insects.

East African countries attacked by locusts could develop an insect-based economy that would address youth unemployment and malnutrition. But this would require governments to create an enabling environment and the private sector to seize the business opportunity. The bottom line would be raising awareness among citizens of the importance of locusts as food, feed and an alternative source of income.

"Go Insect is a company based in Dar es Salaam that produces larva which is used in livestock feed. The larva may be used as sole feed or mixed with other ingredients to produce feed for chicken, fish and pigs.

ZAMBIA

COVID-19: Zambian Scientists Focus on Medicinal Plants and Clinically Established Drugs

Jolwit Saluseki, (Lusaka, Zambia)

Dr Tamala Kambikambi, Vice Chancellor, University of Zambia

BARELY a few weeks after receiving COVID-19 projects funds from the National Science and Technology Council (NSTC) to kick-start their projects, Zambia's medics are seeking a local coronavirus treatment cure. The funds were made available under the Science Granting Councils Initiative (SGCI).

The University of Zambia (UNZA), which received $ 6 000, says it has constituted a team of experts that include medicinal chemists, drug discovery scientists, virologists, botanists, pharmacologists and pathologists to help in the discovery of home-grown low-cost cures for the COVID-19 pandemic.

The consortium of experts will be exploring Zambian traditional medicines or plants and clinically-established drugs in the Zambian formulary as potential treatments for COVID-19.

The team comprises Dr James Nyirenda (the lead investigator), Dr Peter Mubanga Cheuka, Dr Edgar Simulundu, Dr Angela Gono-Bwalya, Dr Takondwa Chidumayo, Dr Katendi Changula, Dr Caroline Chisenga, Dr Wezi Kachinda and Mr Kelly Chisanga.

The team's core mandate is two-fold; firstly, to discover and develop medicines that are readily available for the local population and secondly, to discover and develop local medicines optimized for effectiveness and safety on African or local populations.

Meanwhile, the consortium of experts has confirmed receiving funding from the Ministry of Higher Education through the National Science and Technology Council (NSTC).

The NSTC is part of the SGCI in Sub-Saharan Africa, which aims to strengthen the capacities of SGC in the region in order to support research and evidence-based policies that will contribute to the continent's economic and social development.

The funding received will be used to kick-start the project. In an interview UNZA acting Vice Chancellor Dr Tamala Kambikambi paid glowing tribute to the SGCI and to consortium of researchers championing the discovery and development of the anti-COVID-19 pandemic drug.

Dr Kambikambi said UNZA's research undertaking will solve the problems exacerbated by the unavailability of medicines discovered and developed elsewhere on the African continent.

She adds that Zambia has lagged behind in the area of drug discovery and development since independence hence the urgent need for UNZA to take a lead.

The Dr Kambikambi has also expressed gratitude to the NSTC through the Ministry of Higher Education for the funds received to kick-start the project.

She was happy that the local SGC was playing a critical role in supporting the consolidation of a country's national system of innovation and was central to funding and catalysing research and innovation, thanks to the SGCI facilitated capacity strengthening.

"The team's core mandate is two-fold, first, to discover and develop medicines that are readily available for the

local population and secondly, to discover and develop local medicines optimised for effectiveness and safety on an African or local population," Dr Kambikambi said.

Dr Kambikambi said the NSTC prudence in disbursing funds to the COVID-project to local scientists has proven that the Council represents the interests of Zambia's scientific community.

The NSTC? disburses funds for research and development; build research capacity through appropriate scholarships and bursaries; set and monitor research agendas and priorities.

They also advise on STI policies; manage bilateral and multilateral science and technology agreements; and assess the communication, uptake and impact of publicly funded research.

Meanwhile, UNZA acting Dean in the School of Health Sciences Sody Munsaka has been appointed to the World Health Organisation (WHO) board of experts that will develop guidelines and ethics consideration for issuing of Immunity Passports in the COVID-19 pandemic.

Dr Musanka joins a team of scientists involved in antibody testing that will be used as a measure to give people an immunity passport to move across borders.

Dr Munsaka who is also a lecturer and researcher in immunology, virology, molecular biology, research methods and biostatistics in the school of health science is the only African board member among the 10 member scientists from the United States, Europe and Asian region.

He sits on a number of national committees that include the Health Professions Council of Zambia (HPCZ) and Higher Education Authority (HEA). Dr Munsaka's research interests include patho-immune mechanisms of HIV-associated neurocognitive disorders and interactions with drug abuse and other infectious diseases including malaria and tuberculosis.

Dr Munsaka is a neuro-immune and Infectious Diseases Scientist at the University of Zambia School of Health Sciences. He holds a Master's and PhD degree in Biomedical Sciences-Tropical medicine from the University of Hawaii, Manoa, Honolulu, Hawaii, USA.

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About Science Africa

Science Africa (SA) is a science communications consultancy firm that is keen on popularization of various aspects of STI as the driving force for sustainable socio-economic development in Africa. Since 1994, SA has been providing specialized strategic communications, research, capacity building, media and editorial advisory and hands-on support to various partner organizations in both private and public sectors at national, regional and international levels. SA has a wide network of highly skilled partners spread all over sub-Saharan Africa that are capable of meeting the needs of the most demanding and networked organization. At Science Africa, we believe that no society, country or region can develop without mainstreaming STIs into its core development agenda. We have therefore designed the following menu of products and services to provide support to our partners and clients to realize their strategic goals and objectives in the most sustainable way. http://www.scienceafrica.co.ke.

The Scinnovent Centre

We are a not-for-profit science, technology and innovation policy think tank registered in Kenya. Our mission is to equip policymakers, researchers and business practitioners with the knowledge, tools and skills that enhance their capabilities for innovation, decision-making and wealth creation. Our work is guided by three strategic objectives: (i) generating evidence that supports policy and decision-making: Our research explore the challenges and opportunities presented by scientific, technological, institutional and governance changes and provide end-users and decision-makers with evidence-based policy options (ii) strengthening skills and shaping attitudes: We provide appropriate knowledge, up-to-date information, best practices, tools and hands-on skills on policy analysis, innovation management and knowledge translation and (iii) facilitating interactive learning, networking and dialogue. These interactive sessions allow actors to learn about new things, new ways of doing things and different ways of organizing to achieve better results (More about our work can be found at www.scinnovent.org).

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