

# Research in Africa for Africa

*Responding to Africa's demands in agricultural research*



2014 BecA-ILRI Hub  
Annual Report





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Citation: BecA-ILRI Hub (2014), 2014 BecA-ILRI Hub Annual Report. Research in Africa, for Africa: Responding to Africa's demands in agricultural research. BecA-ILRI Hub, Nairobi.

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Text by Ethel Makila, based largely on published material including the BecA-ILRI Hub business plan.

Design and layout by Ethel Makila.

Cover image: Africa swine fever project field work in Busia, Western Kenya

Printing by Majestic Printing Works Ltd

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# Research in Africa for Africa

*Responding to Africa's demands in agricultural research*

Biosciences eastern and central Africa-International Livestock  
Research Institute (BecA-ILRI) Hub 2014 Annual Report

Kenya national partner in the BecA-led aflatoxin project James Karanja (right) from the Kenya Agricultural and Livestock Research Organization (KALRO) examines samples at the BecA-ILRI Hub (photo: BecA-ILRI Hub\Tim Hall).

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# Introduction

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The Biosciences eastern and central Africa-International Livestock Research Institute (BecA-ILRI) Hub is a co-creation of the African Union's New Partnership for Africa's Development (AU/NEPAD) and the International Livestock Research Institute (ILRI), with the ILRI board of trustees having fiduciary and legal responsibility. The BecA-ILRI Hub was initiated in 2004 when ILRI signed a memorandum of understanding with AU/NEPAD to upgrade and expand existing research facilities at ILRI's Nairobi headquarters and share these with the African scientific community. Financial support for this was provided by the Government of Canada and ILRI. These combined efforts led to the official launch of the BecA-ILRI Hub by Kenyan President Mwai Kibaki on 5 November 2010.

## Meeting a growing demand

The increasing need for biosciences-based innovations for sustainable development in Africa to which the BecA-ILRI Hub responds, is linked with substantial changes in the external biosciences environment over the past decade, including the increasing number of well-trained scientists with research and teaching appointments in African national agricultural research systems (NARS) and universities; increasing demand for undergraduate and postgraduate training in biosciences in Africa and for Africa; increasing interest and investments in modern biotechnology as a key contributor to food security and a driver of income generation; and the increasing progress in developing an enabling environment with supportive policies in intellectual property (IP) management and biosafety regulations in a growing number of African countries.

In building the capacity of African scientists to exploit the opportunities presented by advances in technology, the BecA-ILRI Hub responds to a key resolution of the Science Agenda for Agriculture in Africa developed under the auspices of the Forum for Agricultural Research in Africa (FARA) which states that science for agriculture in Africa is too important to be outsourced to international investors. This approach aims at realising inclusive and sustainable growth by more African countries through a highly developed agricultural sector.

## Setting research for development priorities

There is no single set of priorities to which bioscience is being applied in advancing African agriculture. Rather, several priority themes are emerging from the various Pan African and sub-regional organizations and national governments and demand-side analysis. These themes include:

- food and nutritional safety and security
- income generation for small-scale producers
- climate change adaptation
- environmental sustainability, including the conservation and utilization of biodiversity
- increasing regional and international trade

These themes are amenable to the applications of modern biosciences. The BecA-ILRI Hub, through its multiple African and international partners, including several CGIAR centres and CGIAR research programs (CRPs), has now developed outstanding scientific and technical capabilities to efficiently lead and host strategic research programs that will contribute towards outcomes and impacts on these themes.

## Donors in 2014

The BecA-ILRI Hub's relies largely funding of grants by its investors. These grants are categorized as:

- Capacity building grants to support ABCF Fellows and other visiting scientists, including students;
- Research grants for the Hub's research thematic areas;
- Technology and services (infrastructure) grant to ensure the Hub maintains state-of-art facilities;
- Grants to support weaker national agricultural research systems to develop new bioscience programmes or set up laboratory infrastructure.

The key investors in 2014 included:

- The Syngenta Foundation for Sustainable Agriculture;
- The Bill & Melinda Gates Foundation;
- The Swedish Government;
- Swedish International Development Cooperation Agency (Sida);
- The Australian Government;
- United Nations Educational, Scientific and Cultural Organization (UNESCO).



## Vision and mission statement

**The BecA-ILRI Hub's vision** is to contribute towards improving the livelihoods of millions of resource-poor people in Africa using biosciences-based technologies that improve agricultural productivity, increase incomes and improve food and nutritional security.

**The BecA-ILRI Hub's mission** is mobilizing bioscience for Africa's development by providing a centre of excellence in agricultural biosciences, which enables research, capacity building and product incubation, conducted by scientists in Africa and for Africa, and empowers African institutions to harness innovations for regional impact.

*<http://hub.africabiosciences.org>*

# Foreword



Jimmy Smith  
Director General, ILRI



Appolinaire Djikeng  
Director, BecA-ILRI Hub

A little over ten years ago, the implementation of the BecA initiative started with the establishment of the Hub at ILRI in Nairobi. Since then, the BecA-ILRI Hub has become a key contributor to agricultural transformation in Africa and has laid a strong foundation for agricultural research and capacity building in sub-Saharan Africa.

It is indeed a great privilege to be at the helm of the BecA-ILRI Hub during this '*Innovation Phase*' of the program. We are therefore, pleased to share with you highlights of achievements up to 2014, the year in which the lessons learnt over 12 years culminated in the finalization of a new business plan to guide the next decade of the BecA-ILRI Hub's operation. The BecA-ILRI Hub's successes over the years and specifically in 2014 would not have been possible without the sustained, dedicated support of partners and investors who devote their time, resources and expertise to its programs.

Research and capacity building outputs from this initiative have continued to impact policy and practice in the region. For example, the BecA-ILRI Hub has participated actively in shaping the regional agenda on aflatoxin and African swine fever control. Research on climate-smart Brachiaria grasses is promising farmers better forage alternatives for their livestock. Furthermore, through a project on goats, genetic improvement is finding increasing relevance in the development of breeding strategies and policies in Cameroon and Ethiopia. The BecA-ILRI Hub has also raised awareness and stimulated growth in the domestic cavies value chain in Cameroon and the Democratic Republic of Congo, and raised regional recognition of domestic cavies as important livestock species for food and household income.

Jimmy Smith  
Director General  
ILRI

The BecA-ILRI Hub team and their national, regional and international partners were able to attract sizeable grants to support new efforts in applying genetics research to livestock and crop improvement in Africa, and to enhance capacity building activities. This demonstrates the confidence of various stakeholders in the BecA-ILRI Hub's ability to play a key role in enhancing high quality research and delivery of biosciences innovations in Africa.

Having already established a track record in some key research areas, the BecA-ILRI Hub will use research outputs to broker partnerships with development partners, ensuring a link between cutting-edge science and farmers' needs. Greatly enhanced capabilities for genomics and genotyping are anticipated through the forthcoming Integrated Genotyping Service and Support (IGSS) project to support precision and efficiency in crops and livestock breeding.

Developing strategic collaborations is one of the BecA-ILRI Hub's greatest strengths. Engagements with sub regional organizations; African universities; advanced research institutions in Australia, Europe and USA; and private sector partners increased over the past year and the BecA-ILRI Hub is now able to demonstrate its presence in all 18 eastern and central African countries within the BecA region; western and southern Africa and beyond. These partnerships with advanced and less resourced research institutions will continue to be leveraged to help African researchers find practical solutions to African agricultural challenges.

We hope you enjoy reading these highlights of our collective achievements in empowering African science leaders and institutions to tackle the continent's greatest, most pressing challenges of achieving food and nutritional security.

Appolinaire Djikeng  
Director  
BecA-ILRI Hub

# Strengthening capacity of African scientists and institutions in modern biosciences

The BecA-ILRI Hub's capacity building program was established to address the challenges that prevent individuals and institutions in the region from conducting high quality and relevant research to effectively contribute to food security and improve agricultural productivity. The main delivery mechanism for the capacity building program is the Africa Biosciences Challenge Fund (ABCF) fellowship program, a competitive fund which enables African scientists to spend up to 12 months at the Hub to address key agricultural constraints through research while building their research leadership skills; and hands-on training workshops to acquire relevant research skills.

Our findings were very positive and point to the significant reach and impact the ABCF program has achieved in a short timeframe. Over 90% of stakeholders stated that the BecA-ILRI Hub promotes access to world-class research and training facilities, builds biosciences capacity of individuals and institutions, and promotes African scientists to lead and sustain biosciences research in Africa.

*Impact assessment report by a leading strategy consultancy, Dalberg Global Development Advisors*

The BecA-ILRI Hub's capacity building program is implemented in partnership with regional and international partners such as the African Women in Agricultural Research and Development (AWARD) program; Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA); International Foundation for Science (IFS); and the United Nations Educational, Scientific and Cultural Organization (UNESCO). The activities in this program receive support from the Australian and Swedish Government, the Bill & Melinda Gates Foundation (BMGF), and the Syngenta Foundation for Sustainable Agriculture.

## Providing access to world class bioscience research facilities

Through the BecA-ILRI Hub's flagship capacity building program, the ABCF fellowship, over 60 NARS researchers were hosted for a period of between three months and one year in 2014. During this time they conducted research and were

## Summary of capacity building outputs in 2014

 **240**

NARS researchers trained through short skill-enhancement courses

 **243**

NARS researchers trained in specialized biosciences techniques and use of advanced equipment

 **75**

NARS researchers received full fellowships to conduct research at the BecA-ILRI Hub for up to 12 months

 **At least 40**

Manuscripts from ABCF fellows in process for publication

 **At least 90**

NARS researchers and technicians trained in laboratory management and equipment operations

 **At least 40**

Research proposals developed by NARS scientists who attended proposal writing workshop

 **6**

Collaborative, multi-country research concept notes developed by ABCF fellows

 **5**

Abstracts from ABCF fellows presented at the All Africa Conference on Animal Agriculture

 **4**

ABCF fellows graduated with PhD at national universities

 **4**

ABCF alumni research sub-networks in livestock genetics and crop improvement under development

 **3**

Regional bioinformatics workshops in three different countries for over 150 participants

 **2**

NARS laboratories equipped

 **2**

Partnership brokerage events (Agricultural Research Connections workshops) with 150 scientists from Africa, Europe, USA, South America, Australia & Asia



trained and mentored in project-specific technologies.

Out of the projects conducted as part of these fellowships, new products have already begun to emerge. Among these is the development of new striga-resistant sorghum lines, which were released and made available royalty-free to farmers in Sudan; and the development of diagnostics tests for newly discovered viruses to support massive multiplication of taro to generate disease-free plants for distribution to farmers in Burundi. The BecA-ILRI Hub has also supported early career scientists heading research at NARS and African universities in attaining skills and qualifications that have seen them progress as leaders of research for development in Africa.

Strategic partnerships with the AWARD which co-sponsors a number of women researchers on the ABCF fellowship program and UNESCO which facilitates the participation of early career women scientists and university lecturers to the annual 'Advanced genomics and bioinformatics' workshop have enabled the BecA-ILRI Hub increase its reach to women scientists in the region.

A memorandum of understanding between the BecA-ILRI Hub and the International Foundation for Science (IFS) for joint regional capacity building enables the support of field research activities for co-funded research fellows. This is accomplished through the coordinated support of BecA-ILRI Hub ABCF fellowships and IFS' individual research grants.

### Supporting NARS through hands-on training workshops

The BecA-ILRI Hub trained over 240 NARS researchers in the region through its annual technical training workshops: Introduction to molecular biology and bioinformatics; Laboratory management and equipment operations; Advanced genomics and bioinformatics; and Scientific writing. In addition to its core workshops, the BecA-ILRI Hub developed additional trainings in partnership with ASARECA that enabled NARS researchers from DRC, Eritrea, Madagascar, Rwanda and South Sudan to enhance their capabilities in research leadership. The workshops aimed at equipping scientists to compete for funding opportunities; apply and integrate agricultural innovation systems and value chain development in proposal development, and research program implementation and monitoring; and to make them more effective leaders, managers and mentors.

### Keeping up with the BecA-ILRI Hub alumni

To ensure sustainability of the capacity building outputs, great importance is placed on keeping in touch with the growing network of African researchers who have engaged in research or training at the BecA-ILRI Hub. The continued engagement with the BecA-ILRI Hub alumni has enabled the monitoring of the development of communities of practice through scientists' interactions at the Hub; their ability to apply new techniques learnt at their home institutions; and to provide placement support.



*Rasha Ali, a researcher from the Agricultural Research Corporation (Khartoum, Sudan) developed striga resistant sorghum lines for distribution to farmers in Sudan. Part of her research was conducted at the BecA-ILRI Hub (photo: BecA-ILRI Hub\Valerian Aloo).*



*A hands-on session during the annual introduction to molecular biology and bioinformatics training workshop (photo: BecA-ILRI Hub\Tim Hall).*

## Charles Masembe: African leader in livestock disease research



**Charles Masembe** is a veterinarian and an Assistant Professor in the College of Natural Sciences at the Makerere University in Uganda.

In 2010 and 2011, Dr Masembe conducted research at the BecA-ILRI Hub on genetic factors linked to the transfer of African swine fever (ASF) in Uganda. The country has the largest pig population (3.2 million) and most rapidly growing pig production in eastern Africa. This thriving industry is threatened by ASF, the devastating viral disease with regular outbreaks that kill 90-100 percent of herds affected.

Through his research at the BecA-ILRI Hub, Masembe, shed light on the existence of the *Ndumu virus* in domestic pigs, a phenomenon which had not been previously observed. Building on that discovery, he continued to lead key research efforts on understanding ASF and has now been awarded a five-year Wellcome Trust Public Health and Tropical Medicine fellowship. He will investigate the distribution patterns, and full genome characteristics that influence the maintenance and transmission of African swine fever at the livestock-wildlife interface in Uganda.

The results of his research will contribute to the development of effective control strategies for this devastating disease that is impeding the development of the pig industry in Uganda.

## Supporting growth of early career researchers

**Gladness Elibariki** is an Assistant Lecturer in the Department of Molecular Biology and Biotechnology at the University of Dar es Salaam (Tanzania). Elibariki has been carrying out research on two major cassava viruses, part of which was conducted at the BecA-ILRI Hub under the ABCF fellowship program. Elibariki's work feeds into a bigger research program at the Mikocheni Agricultural Research Institute (MARI), Tanzania, which receives technical back-stopping from the BecA-ILRI Hub and aims at producing several cassava cultivars that are resistant to the Cassava mosaic disease. In 2014, Elibariki successfully defended her research work and graduated with a Ph.D. in Biotechnology.



**Joshua O Amimo** is an Assistant Lecturer in the Department of Animal Production at the University of Nairobi (Kenya), conducting research on swine enteric viruses affecting pigs in smallholder



farms along the Kenya-Uganda border. His work at the BecA-ILRI Hub was co-sponsored by the Ohio State University and feeds into the BecA-led project on understanding the epidemiology of ASF. This research will help in the development of accurate diagnostic tools and implementation of appropriate control strategies for pig diseases to improve pig health and production. Following his placement at the BecA-ILRI Hub, Amimo received his Ph.D. in Animal Genetics and Breeding in 2014.

**Adey Feleke**, a lecturer in the Faculty of Life Sciences at Addis Ababa University in Ethiopia has been conducting research aimed at developing environmentally sustainable industrial waste water management systems. Through an ABCF fellowship co-funded by the Bio-resources Innovations Network for Eastern Africa (Bio-Innovate) she used advanced genomics and bioinformatics approaches and tools to conduct in-depth studies of microbial communities from industrial waste water. and was thereafter awarded a PhD in Environmental & Energy Biotechnology.





*Esther Kanduma, a lecturer in the Department of Biochemistry at the University of Nairobi in Kenya spent five months as an ABCF fellow co-funded by AWARD working on the development and validation of a rapid lateral flow test for Theileria parva infection in cattle. Her research is contributing to the development of tools for the monitoring and control of East coast fever in cattle (photo: BecA-ILRI Hub\Valerian Aloo).*



# Transforming agricultural research in Africa

The BecA-ILRI Hub experienced exciting developments both in science and in progress towards development impacts through its core research programs that are focused on crop improvement, food safety and improved nutrition, livestock productivity, climate change resilience and low input crop and livestock for alternative nutrition and income sources.

## Priority research themes emerging from demand-side analysis

- Crop improvement
- Food safety and improved nutrition
- Livestock productivity
- Climate change resilience
- Low input crop and livestock for alternative nutrition and income sources.



*Helen Nigussie, a lecturer in animal breeding and genetics at Ambo University in Ethiopia was offered support by the International Society for Animal Genetics to present at their 34th conference (July 25- August 1, 2014) in Xi'an, China, based on her work on the genetic diversity and matrilineal genetic origin of local sheep populations of eastern Ethiopia conducted at the BecA-ILRI Hub under the ABCF fellowship.*

*Helen's poster was among 400 selected competitively on the basis of scientific merit, with emphasis on new research results, cutting-edge developments and novel perspectives and direct relevance to the field of animal genetics.*

## Achieving sustainable gains in goat genetic improvement

Goats are a resilient livestock that can spur rural livestock based development options especially in areas with harsh climatic conditions.

The BecA-ILRI Hub led project on goat improvement being implemented in Cameroon and Ethiopia is focused on developing technologies to take advantage of the genetic and other attributes of goats to increase their productivity and improve the livelihoods of goat keeping communities.

The project which is being conducted in collaboration with the national partners in both countries, has influenced policies through the close engagement of different stakeholders in the goat value chain. In Cameroon, the government has begun a program to revive three small ruminant breeding stations which will create training opportunities in breeding and forages production

In Ethiopia, the project has involved local communities in designing a goat improvement program through deciding which traits in their indigenous goats they wanted to breed for and tagging selected bucks to enable prediction of their future offspring's performance. The progeny of these bucks will be evaluated and the best among them used for subsequent generations

until the breeding objectives are attained. The project supports human capital development through the involvement of students and NARS researchers in the studies.

## Controlling the spread of African swine fever in eastern Africa

African swine fever (ASF) is a devastating emerging disease of pigs that causes almost 90-100 percent mortality in pig herds.

The BecA-ILRI Hub project on ASF seeks to contribute to disease management strategies that will benefit smallholder farmers in more than 20 countries in eastern, central, western and southern Africa. Currently there is limited data on total numbers of farmers affected in Africa; this project is contributing to provide a better understanding of the impacts for Uganda and Kenya.

The project team is led by ILRI Biosciences scientists and implemented in Kenya and Uganda through a multi-disciplinary team (veterinarians, molecular biologists, social scientists and others) in collaboration with Australia's national science agency, CSIRO; the African Union's Interafrican Bureau for Animal Resources

## Research programs

(AU-IBAR); and the Food and Agriculture Organization of the United Nations (FAO). The project also involves farmers, traders, veterinary and animal production services, researchers, government departments, civil society and development partners.

Findings from the project have informed the design of continental strategies for control and prevention of the spread of the disease. A set of guidelines for controlling the spread of ASF has been developed in partnership with key actors in the departments of veterinary services in Kenya and Uganda.

As a result of the project, pig farmers in both target countries are better linked to the local District Veterinary Services for advice and support on general disease management and ASF outbreaks. There is also an increased awareness of biosecurity measures in pig production by farmers. Through the project's validation of rapid real-time field diagnostics kits, more rapid confirmation of ASF outbreaks is enabling veterinary authorities to implement control measures during outbreaks. A major finding regarding the non-detection of the virus through blood sampling due to its location in tissues is critical to

disease surveillance and monitoring, and quarantine strategies.

### Finding a region-wide solution to aflatoxin contamination of maize in eastern and central Africa

Over 100 million people across eastern Africa depend on maize as a staple food. However, maize is susceptible to accumulation of toxic fungal metabolites (mycotoxins). Given the technologies required for detection, these invisible toxins are under-recognized threats to the health of African populations and barriers to development and maize trade.

The aflatoxin research project is contributing to the increased capacity to characterize and reduce the presence of mycotoxins in the food supply in eastern and central Africa. In response to a regional gap, the BecA-ILRI Hub established a mycotoxin analytical platform which is evaluating the current aflatoxin risk in Kenya and Tanzania to enable development of potential mitigation strategies.



Edward Okoth (right) scientist from ILRI Biosciences group and project leader in the BecA-ILRI Hub African swine fever project takes samples from a pig in Busia county, western Kenya (photo: BecA-ILRI Hub\Tim Hall).

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**As a result of the project, pig farmers in both target countries are better linked to the local District Veterinary Services for advice and support on ASF outbreak management**

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Jacqueline Kasiiti Lichoti (left) from the Kenyan Ministry of Livestock, is a key member of the ASF research team. In 2014, she visited Alice Springs, Australia to work with CSIRO researchers including Jocelyn Davis (right) to analyse data collected from the field in western Kenya and eastern Uganda as part of her PhD studies.

Jacqueline works directly with the veterinarians in the Ministry who are responsible for working with community members (pig farmers) on biosecurity and animal health – a key link that ensures the project will deliver impacts.

## Research programs

The team has established biosafety level 2 (BSL2) mycology capacity, as well as a range of diagnostics technologies and protocols for use in mycotoxin detection and fungal analysis at the BecA-ILRI Hub. Over 60 researchers from the region and abroad as well as private sector stakeholders have been supported in using the mycotoxin analytical platform.

Variations in maize germplasm that are susceptible to aflatoxin accumulation have been identified.

As a result, maize breeders in Kenya and Tanzania are beginning to develop less susceptible maize varieties in their breeding programs.

A fungal biobank of *Aspergillus* isolates collected in the two focus

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**Researchers from the region and abroad as well as private sector stakeholders have been supported in using the mycotoxin diagnostics platform**

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countries has been established and will assist researchers in more in-depth studies of mycotoxins and in the use of advanced nutritional analysis technologies.

The downstream impact of the project is estimated to include at least 150,000 people - including subsistence and other smallholder farmers, and the urban poor - who rely on maize as a food security staple in East Africa. The interventions being developed by the project are scalable with the potential of impacting millions.

## A vision for safe, affordable and adequate food – Kenya Cereal Millers Association joins forces with scientists

*By Paloma Fernandes, CEO of the Kenya Cereal Millers Association*



Having a milling capacity of 1.6 million tonnes of maize per year and constituting 85% of the commercial flour on the shelves sold to about 10 million consumers annually, the Cereal Millers Association (CMA) bears the heavy responsibility of providing safe, affordable and adequate food for their consumers. This responsibility is at the heart of our vision as an association which comprises 27 of the largest millers in the country.

Our four-year relationship with the BecA-ILRI Hub's aflatoxin research project was borne out of our quest to bridge the existing gap in best practices for diagnosis of aflatoxins at the millers' level. In efforts to find a solution, we participated in various national forums on the control of aflatoxins in the food value chain in Kenya and eventually made the connection with the project.

Through our collaboration with the BecA-ILRI Hub, CMA staff members have received training on the proper use of aflatoxin diagnostics equipment to get the most accurate results.

Visits by the BecA-ILRI Hub scientists, research technicians and project collaborators to three CMA mills has helped us ascertain the levels of testing, training needs and ways in which we can improve our storage, transport and testing facilities.

In order for us to take adequate

measures in providing safe food for Kenyans, we have extended our collaboration to exploratory research on the types of aflatoxins we are dealing with at our mills and will provide samples of both wheat and maize to the BecA-ILRI Hub for analysis.

Through this partnership, we have also identified a consultant from Texas A&M University, USA, to develop and test the feasibility of maize sampling and aflatoxin testing protocols for use in Kenyan maize mills - an initiative in which many of our mills are involved.

The dream of CMA is to have a fully-fledged laboratory for testing of aflatoxins and we believe with the support of research institutions like the BecA-ILRI Hub, this dream is not very distant. Ultimately we hope that we can achieve our goal to provide safe, affordable and adequate food for all our consumers.



# The BecA-ILRI Hub's research partners

## **Harnessing genetic diversity for improved goat productivity**

- Ethiopian Institute of Agricultural Research
- Institute of Biodiversity Conservation, Ethiopia
- Tigray Regional Agricultural Research Institute, Ethiopia
- Amhara Regional Agricultural Research Institute, Ethiopia
- Ethiopian Wildlife Conservation Authority
- South Regional Agricultural Research Institute, Ethiopia
- University of Dschang, Cameroon
- Institute for Agricultural Research for Development, Cameroon
- Ministry of Livestock Fisheries and Animal Industries' Small Ruminant Support Program, Cameroon
- Nelson Mandela African Institute for Science and Technology, Tanzania

## **African swine fever: diagnostics, surveillance, epidemiology and control:**

- Makerere University, Uganda
- Ministry of Agriculture, Animal Industries and Fisheries, Uganda
- Ministry of Livestock Development, Kenya
- Centro de Investigación en Sanidad Animal (CISA-INIA) (an FAO and EU ASF Reference Centre) Madrid, Spain
- Commonwealth Scientific and Industrial Research Organisation (CSIRO), Australia

## **Capacity and Action for Aflatoxin Reduction in Eastern Africa (CAAREA)**

- Kenya Agricultural and Livestock Research Organization
- Tanzanian Agricultural Research Institute
- Ministry of Agriculture and Food Security, Tanzania
- Open University of Tanzania
- CSIRO, Australia
- HarvestChoice, USA
- University of Queensland/ Queensland Alliance for Agriculture and Food Innovation, Australia
- The Queensland Department of

Agriculture, Fisheries and Forestry, Australia

- Cornell University, USA
- University of Minnesota, USA
- University of Pretoria, South Africa

## **Leaving a bad taste in aphids' mouths - Sustainable disease management in beans**

- University of Cambridge, UK
- Rothamsted Research, UK
- The Eastern and Central African Bean Research Network (ECABREN) coordinated by CIAT, Uganda

## **Clean and resistant planting materials: plant tissue culture and transformation projects**

- Ethiopian Institute of Agricultural Research
- International Institute of Tropical Agriculture (IITA)
- Mikocheni Agricultural Research Institute, Tanzania
- National Crops Resources Research Institute, Uganda
- Makerere University, Uganda

## **Healthy crops and livestock: tools to detect and address disease (diagnostics projects)**

- The Department of Veterinary Services, Kenya
- National Animal Disease Diagnostics and Epidemiology Centre, Uganda
- Tanzania Veterinary Laboratory Agency
- Foreign Animal Disease Diagnostic Laboratory United States Department of Agriculture/Animal and Plant Health Inspection Service/Foreign Animal Diagnostics Laboratory (USDA/APHIS/FADDL), USA
- The University of Nairobi, Kenya
- Mikocheni Agricultural Research Institute, Tanzania
- Ethiopian Institute of Agricultural Research
- The University of Burundi
- Institut des Sciences Agronomique du Burundi (ISABU), Burundi
- Institut de recherche pour le développement (IRD), France
- Colorado State University, USA
- The Food and Environment Research Agency (FERA) UK;

- Cornell University, USA
- Kenya Agricultural and Livestock Research Organization

## **Climate-smart Brachiaria grasses for improved livestock production in East Africa**

- The Centre for Tropical Agriculture (CIAT), Colombia
- Kenya Agricultural and Livestock Research Organization
- Rwanda Agricultural Board
- Grasslanz Technology Ltd, New Zealand.

## **Domestic cavies: improving production, nutritional protein and household income**

- University of Dschang, Cameroon
- The Ministry of Livestock, Fisheries and Animal Industries, Cameroon
- Institute of Agricultural Research for Development, Cameroon
- Farmer's Voice Radio, Cameroon
- International Centre for Tropical Agriculture (CIAT);
- Université Evangelique en Afrique, DRC
- Women for Women, DRC
- Institut National de Recherche Agricole (INERA), DRC
- Vétérinaires Sans Frontières, DRC
- CSIRO, Australia

## **Amaranth: adding nutrition to African diets through low cost sustainable processing**

- Jomo Kenyatta University of Agriculture and Technology in Kenya
- Sokoine University of Agriculture, Tanzania
- The World Vegetable Centre (AVRDC), Tanzania
- CSIRO, Australia
- Annico Enterprises, Kenya

## **New blast-proof rice for Africans**

- University of Exeter, UK
- University of Arkansas, USA
- Kenya Agricultural and Livestock Research Organization
- Makerere University, Uganda
- The Ohio State University, USA
- Station de Recherches de Farako-Bâ, Burkina Faso

### Australia-Africa partnership for food and nutritional security

Through an Australian Government funded partnership with Australia's national science agency, CSIRO, the BecA-ILRI Hub established projects to conduct research on crops and livestock traditionally neglected by researchers and industry due to their low economic importance on the global market. These crops and livestock have opened new avenues to address food security that are inclusive of more people and that are adaptable to harsh climatic conditions.

### Small animal makes big waves *Domestic cavies on Africa's livestock agenda*

The domestic cavies project was established to increase access to food and income for resource poor farmers in Cameroon and the eastern Democratic Republic of the Congo (DRC) by improving the productivity of this low-input livestock.

Through dynamic innovation platforms, the project has stimulated better organization of cavy farmer groups and traders who support each other in production and marketing in both Cameroon and DRC.

Farmers have been able to raise their stock from as little as 15 animals burdened with disease and high mortality rates to over 50 thriving animals as a result of better management and feeding practices as taught by the project.

A sustained communication campaign has raised the profile of domestic cavies from 'neglected livestock' to animals on the livestock agenda in the region. In

both Cameroon and DRC, cavies are included on the countries' livestock development map.

The project is led by the University of Dschang, Cameroon, and brings together partners from governments, universities, non-governmental organizations and the media in Cameroon and DRC.

### Research supporting small enterprises

#### *Partnership supports amaranth business*

The amaranth project team generated key research outputs to support new partnerships with NGOs, SMEs and commercial food companies. One such company is the Annico Enterprises, which produces, packs, and sells a variety of amaranth based food products.

Annico proprietor Anne Muthoni benefited from networking forums for all amaranth market players organized by the amaranth project. Her business concept was recognized and given the Innovation Accelerator award by the Global Alliance for Improved Nutrition (GAIN) which includes support to take her innovative idea to scale.

According to Muthoni, the current supply of amaranth in the country is still insufficient to meet market demands. This, she says, is an indicator of a good business opportunity for farmers whom, with access to constant water supply, can grow and harvest amaranth all year round.

The amaranth project is led by the Jomo Kenyatta University of Agriculture and Technology in Kenya and brings together partners from universities and research institutions in Kenya and Tanzania.

### Sustainable disease management in beans

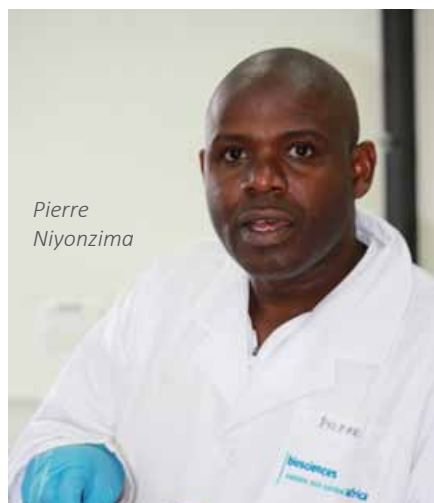
Beans, which are rich in key vitamins and minerals, including folate, iron and zinc, are an important crop for reducing poverty, improving human health and nutrition, and enhancing ecosystem resilience. Over 200 million people in sub-Saharan Africa depend on beans as a primary food crop. However, aphid transmitted bean viruses Bean Common Mosaic Virus (BCMV) and Bean Common Mosaic Necrosis Virus (BCMNV) are causing huge yield losses for smallholder farmers in Africa.

Through the bean research project, the BecA-ILRI Hub is developing tools (transformation, diagnostics) to control the spread of aphid-transmitted viruses which are responsible for bean yield losses in common beans in eastern and central Africa. The project is led by researchers from the University of Cambridge and involves researchers from the UK and Africa.



*Former BecA-ILRI Hub research technician, Francis Wamonje, is working on a component of the BecA-ILRI Hub's bean project, as a PhD student at the University of Cambridge under the supervision of Dr John Carr who leads the project. Wamonje successfully developed and validated a technique to accurately and rapidly determine the species of aphids (photo: Cambridge University/Djana Maric).*

### Enhancing food security through improved and clean planting materials and better crop and livestock disease diagnostics



Pierre  
Niyonzima



Donatien  
Bigirimana



Gaspard  
Ndarubayemwo

*Donatien Bigirimana and Gaspard Ndarubayemwo, assistant researchers at the University of Burundi; and Pierre Niyonzima, a research assistant at the Burundi Agricultural Research Institute (ISABU) conducted their research at the BecA-ILRI Hub in partnership to produce clean planting material for taro in Burundi (photo: BecA-ILRI Hub\ Valerian Aloo).*

#### Tissue culture

Tissue culture is among the most widely used biotechnologies in African agricultural improvement. When applied correctly, it enables the large scale production of disease-free, high performing, farmer-preferred varieties.

While there are many tissue culture facilities in sub-Saharan Africa disseminating their products to small holder farmers, most of these laboratories only have a limited range of crop species and are not incorporating virus indexing to ensure that their end products are in fact disease-free.

The BecA-ILRI Hub has focussed on enhancing the operations of tissue culture facilities in eastern and central Africa to enable them to provide disease free planting materials of a wider range of crop species to small holder farmers.

Participating laboratories and targeted species were strategically selected to achieve increased food and nutritional security in eastern and central Africa.

Work on various crops was carried out in collaboration with research institutions in Ethiopia, Tanzania and Uganda.

Efficient methods for the transformation of cowpea; virus elimination and *in vitro* multiplication of various food crops including baobab from Tanzania; passion fruit from Uganda; garlic from Ethiopia; and yam from Uganda have been developed. These projects linked closely with the BecA-ILRI Hub's

virus discovery and diagnostics development projects.

#### Diagnostics

Proper diagnosis of crop and livestock diseases play an important role in enhancing food security. While diagnostics tools that are highly sensitive and specific in identifying diseases have been developed, they require laboratories with expensive equipment and highly trained personnel.

The BecA-ILRI Hub diagnostics program has adapted a variety of existing diagnostics for developing country laboratories. The research is being conducted in collaboration with national veterinary laboratories in Kenya, Uganda and Tanzania as well as research institutions and universities in Burundi, Ethiopia, France, Kenya, Tanzania, UK and USA.

The diagnostics program has contributed to the production of disease-free planting materials for passion fruit to be reproduced in Uganda, Rwanda and Kenya; taro for Burundi; and yam for Tanzania. All the technologies and tools developed are suitable for use in low technology laboratories.

Through the virus discovery and sequencing projects the Ugandan passiflora virus (UPV) which is the major virus infecting passion fruit in Uganda was discovered in Rwanda and Kenya. This virus is unknown outside of Africa and had never before been fully sequenced.

The Cowpea aphid-borne mosaic virus (CABMV), UPV, Maize chlorotic



mottle virus (MCMV) and Sugarcane mosaic virus (SCMV) genomes have also been fully sequenced. Diagnostic assays for MCMV and SCMV that are suitable for low-tech laboratories are under development

and will contribute greatly to the understanding of the maize lethal necrosis disease (MLND), an emerging disease that has so far had very devastating effects on maize crop yield in eastern Africa.

### Climate-smart Brachiaria grasses for sustainable livestock production in eastern Africa

Livestock, which contributes to 35 percent of the agricultural gross domestic product in sub-Saharan Africa (SSA), is greatly hampered by the shortage of quality forage.

The inherent ability of Brachiaria grasses to grow in drought and marginal soils make them ideal forage for the over 54 percent of SSA which comprises arid and semi-arid zones. The BecA-ILRI Hub's program on Brachiaria grasses seeks to improve livestock productivity in five eastern African countries by increasing the availability and quality of these grasses that are adapted to drought and marginal soils.

The research program being conducted in collaboration with national partners in Kenya and Rwanda as well as international research institutions and the private sector, has engaged smallholder farmers in Brachiaria cultivation and plans to develop seed production as a source of household cash income. More than 400 farmers from Kenya and Rwanda participated in a variety selection process which led to the selection of five best-bet cultivars for biomass production and seed production in different agro-ecological regions. Two hundred and thirty six (236) farmers in Kenya and 75 in Rwanda were trained on

Brachiaria production, and farmer to farmer dissemination of the grasses is already taking place in Rwanda. Forty Rwandan farmers growing Brachiaria are recording the milk production data.

Semi-field studies at CIAT confirmed superiority of several Brachiaria cultivars to Napier and Rhodes grass for drought tolerance. Using a novel procedure for Brachiaria endophyte isolation and molecular characterization developed at the BecA-ILRI Hub, the molecular identification of 515 microbes (440 fungi and 75 bacteria) out of 645 microbial isolate/strains isolated from healthy Brachiaria plants and rhizoplane soils has been completed. Several endophytic and plant associated microbes from Brachiaria were found with multiple properties that are beneficial to plant growth and development.

The program has been successful in identifying best bet cultivars and creating awareness among the farmers, researchers, extension agents, policy makers and politicians on the importance of Brachiaria grasses as quality forage. The basic procedures for endophyte research developed at the BecA-ILRI Hub are being used by collaborating institutions.



*Jane Mwathi, a researcher at the Kenya Agricultural and Livestock Research Organization (KALRO) was supported through an ABCF fellowship in carrying out research on the devastating Maize lethal necrosis disease (MLND). During her placement, she collaborated with BecA-ILRI Hub's virus discovery projects in the in-depth study of the microorganisms causing this disease.*

*Information generated from her research will contribute to the development of effective on-farm disease management strategies that will complement the existing strategies of uprooting and removing the affected plants; crop rotation or growing of alternative crops; early planting; and chemical spraying of vectors under specific circumstances.*

### Brachiaria Buzz



*The hitherto overlooked Brachiaria grasses are receiving more attention in eastern Africa as a result of awareness-creation efforts by research teams. A paper presented at the 6th All Africa Conference of Animal Agriculture gave an overview of the research, successes and challenges of adopting improved Brachiaria hybrids in the African context. The paper has raised interest in the research towards improving local varieties. This paper was co-authored by nine scientists from seven institutions including Dr Sita Ghimire (right) who leads the research at the BecA-ILRI Hub.*





*Netsanet Zergaw takes part in field sampling of goats in Luma Tatesa in the Oromia region of Ethiopia. Netsanet is an MSc Student from Haramaya University, Ethiopia and was involved in the the BecA-ILRI Hub led project on 'Harnessing genetic diversity for improved goat productivity' (photo: BecA-ILRI Hub\ Sarah Osama).*



## Providing access to state-of-the-art technologies in Africa

To better support research and capacity building in the region, the BecA-ILRI Hub has established a number of technology platforms comprising a range of high-end equipment necessary for advanced agricultural biosciences research. These shared facilities are available for use by African scientists and students and international partners and are continually upgraded to respond to dynamic research needs and reflect global technological trends.



*Moses Njiriri Mburu, smallholder farmer in Ndeiya, central Kenya who hosts the annual scientists field visits during the Agricultural Research Connections workshops (photo: BecA-ILRI Hub\Marvin Wasonga).*



*Long haired goat in Ubiri village, Lushoto, Tanzania (photo: ILRI\Niels Teufel).*



*The Illumina genome sequencing machine that has increased the capacity for sequencing of crop and livestock (photo: BecA-ILRI Hub\Francesca Stomeo).*

### Genomics platform

Genomics — the analysis of the complete genetic blueprint of living things — has revolutionized agricultural research. This field of science holds vast potential for the development and strategic deployment of existing crop varieties and livestock breeds that can thrive in an increasingly hostile environment.

The scope and capacity of the BecA-ILRI Hub's genomics platform was significantly enhanced by the acquisition of the Illumina genome sequencing machines (Illumina MiSeq). The MiSeq machines have increased the sequencing throughput and complemented the Roche 454 pyrosequencing platform while significantly reducing per-base sequencing costs. These technologies which were previously unavailable to regional scientists, are actively being used to support the decoding of various genomes. Using the combination of low, medium and high throughput sequencing, the BecA-ILRI Hub and partners generated over 1300 GB of sequencing data, the equivalent of 435 human genomes.

The genomics platform supports a wide range of research projects ranging from animal and plant virus discovery, detection and diagnostics of disease causing

agents (pathogens) in crops and livestock, in-depth studies of genetic material recovered directly from environmental samples, genetic studies of viruses and their interactions with infected hosts, molecular breeding and detection of food borne pathogens.

Through continuing collaboration with the NARS researchers, the genomics platform will help guide the design of strategies for disease management.

### Bioinformatics platform

The Bioinformatics platform provides scientific informatics support for research projects led by NARS. It leverages on the genomics platform to provide advanced computational services enabling access to high performance computing, storage, management and analysis of genomic information. The platform is composed of computing architecture with 152 computing cores, over 500 gigabytes of memory and 40 terabytes of shared disk storage

These advanced computational services have enabled the translation of huge amounts of sequencing data produced through research into practical information on livestock breeds, crop varieties, an elucidation of differences between breeds and responses to environmental stress.



Aside from supporting data interpretation functions for research conducted at the BecA-ILRI Hub, the platform is equipping researchers from across Africa with skills in bioinformatics. Institutional workshops held across eastern and central Africa in partnership with the Swedish University of Agricultural Sciences (SLU) have given NARS researchers access to a complete kit of bioinformatics tools, enabling them to work independently from any location.

The platform also underwent a number of upgrades worth approximately USD 200, 000 in its computational hardware and software to ensure enhanced support to its various users.

## Mycotoxin and nutritional analysis platform

The mycotoxin and nutritional analysis platform was established due to the increasing demand for nutritional security and food safety research. The facility is equipped with technologies that provide a combination of both qualitative and quantitative techniques of aflatoxin and other mycotoxin (fumonisins, ochratoxin, etc) measurements. In addition, proximate analysis, minerals, vitamins, antioxidants and a range of other nutritional analyses can be conducted. The platform now includes Biosafety Level 2 mycology and milling laboratories; and an extensive nutritional analysis platform containing LCMSMS, UPLC, AAS, GC-MS, UV-Vis, FT-NIR, and a range of aflatoxin-specific equipment (VICAM, Neogen Accuscan strip readers, Romer FQ readers, ELISA and others). It is supported by a dedicated team of researchers within the BecA-ILRI Hub as well as

affiliated scientists from the region and internationally. Human and technical capacity enhancement has been accompanied by increases in requests for support, and number of NARS scientists and international projects hosted by the platform, with over 60 researchers having used it since it was established in 2011.

## Diagnostics platform

The diagnostics platform was established to facilitate the development, validation and application of molecular diagnostics tools with a focus on animal and plant pathogens that are major constraints in African agricultural development.

Through a partnership with the Swedish National Veterinary Institute (SVA), the BecA-ILRI Hub has strengthened its state of the art molecular diagnostic platform to support rapid, efficient and accurate detection of livestock and crop pathogens. New diagnostic tools developed on this platform are available and will be used in pathogen surveillance and control strategies, and the knowledge gained on diagnostics of diseases prevalent in Africa transferred to national laboratories.

Experts from the SVA, which is a World Organization for Animal Health (OIE) laboratory will guide the accreditation of the diagnostics platform.

## Breeding platform

The Breeding platform at the BecA-ILRI Hub was designed to enhance plant breeding and livestock research efficiency. The platform hosts a regional hub of the Integrated Breeding Platform (IBP) which is coordinated by the CGIAR

Generation Challenge Program and gives breeders access to the Breeding Management System (BMS), an all-in-one suite of tools for effectively management of activities from project planning to final decision-making.

The platform is also an implementing partner in the 'Demand-led plant variety design' research and development alliance with the Syngenta Foundation for Sustainable Agriculture (SFSA), the Australian International Food Security Research Centre of the Australian International Agricultural Research Centre (AIFSRC/ACIAR), the Crawford Fund and the University of Queensland. Through this alliance, regional crop breeders are being equipped with the skills to develop more high performing varieties that meet customer requirements and market demand.

Funds secured from BMGF in 2014 will support an innovative public-private partnership with a Canberra based company to provide low cost and efficient genotyping services to research and breeding companies. Through this partnership, the Integrated Genotyping Service and



*The establishment of a nutrition laboratory at the BecA-ILRI Hub has enabled the International Potato Centre (CIP) to conduct a range of analyses on sweet potato fresh roots and orange-fleshed sweet potato derived food products in Kenya (photo: BecA-ILRI Hub\ Marvin Wasonga).*

Support (IGSS) will contribute to the accelerated rate and increased performance of improved crops and livestock. The platform supports

breeders from the NARS, small and medium enterprises and other scientists in integrating DNA marker technology and genomic tools into

their breeding program and research activities for both cultivated and under-researched crops and livestock.

## Increased access by NARS scientists and their regional and international partners working to solve Africa's agricultural challenges

The technologies, facilities and scientific community at the BecA-ILRI Hub continue to attract increased demand for use of the Hub by Africa's leading scientists and their regional and international partners working on continental agricultural issues.

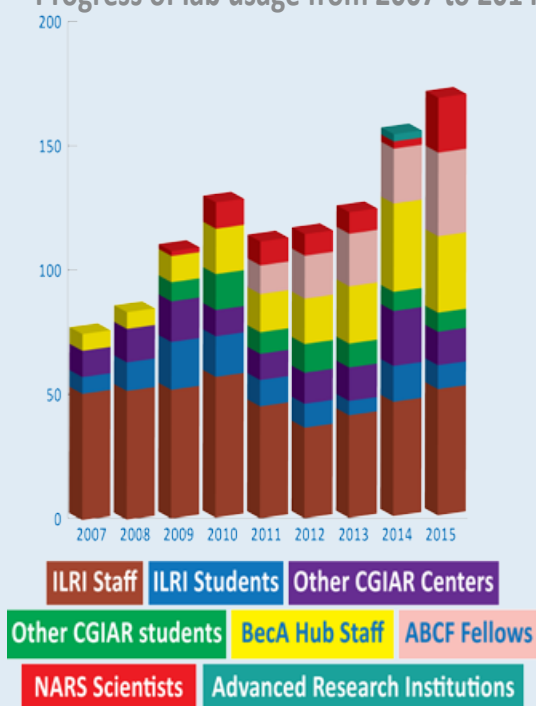
The number of lab users has doubled from 2007 to 2014. The establishment of the ABCF resulted in a steady increase in the number of full time equivalent fulltime Hub users (FTEs). The other client groups that have been steadily increasing are CGIAR crop centres, with increases in both the number of CGIAR scientists and African students linked to CGIAR programs being implemented at the Hub; and increases in the number of hosted research programs which include collaborating NARS scientists and students. A new group of lab users, the advanced research institutions (ARIs) are now making use of the facility. Despite

the increase in FTEs, there still remains untapped potential given the diverse technology platforms and available lab space.

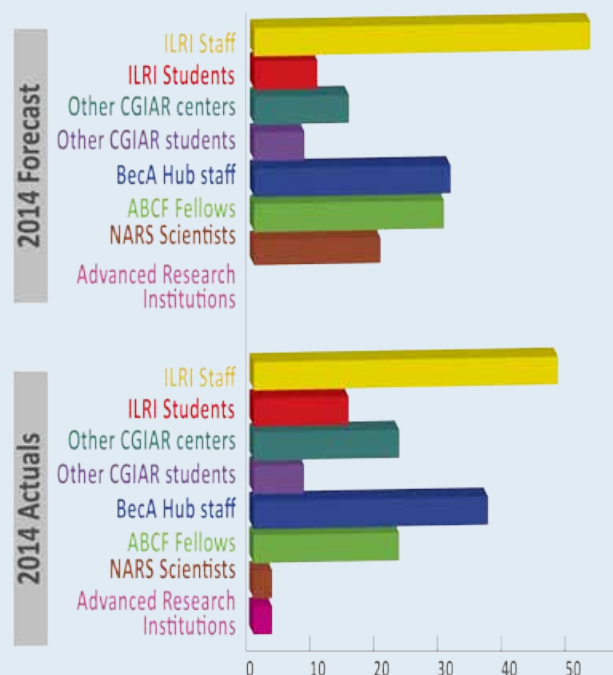
An upward trend in total Hub clients is predicted in 2015 onwards, with a substantial planned increase in the number of ABCF fellowships and other sources of regional research program support available to scientists coming from African NARS and universities.

While there has been a progressive increase in the number of Hub 'client' numbers expressed as FTEs, these figures do not fully reflect the wider extent of the BecA-ILRI Hub's regional reach. Many research partners remain based at their home institutions and send samples for analysis, visiting the Hub only for short periods of time and thus are not included as FTEs.

Progress of lab usage from 2007 to 2014



Projected and actual lab usage for 2014



# Revolutionary breeding technology sets base at the BecA-ILRI Hub – upcoming Integrated Genotyping Service and Support

By Gary Atlin, Senior Program Officer at the Bill & Melinda Gates Foundation



A revolution in plant breeding technologies has raised the rate of success in increasing the performance of improved crops and livestock. The new tools can process genetic data quickly, more accurately and affordably and thus help shorten breeding cycles. These advances have been largely unavailable to breeding programs serving African smallholders due to the high cost of commercial genotyping services based in Europe, the US, and Australia; and due to the limited capacity of the breeding programs to interpret and apply the data generated.

The Integrated Genotyping Service and Support (IGSS) project, a collaboration between the BecA-ILRI Hub and Diversity Arrays Technology (DArT) PTY Ltd, seeks to overcome these barriers by providing genotyping services within Africa. The services will be coupled with a comprehensive decision support

package that will enable plant and livestock breeders apply the genomic data produced to increase the efficiency of their development pipelines.

This public-private partnership between the BecA-ILRI Hub's and DArT is strategic on two significant levels. Diversity Arrays Technology PTY Ltd is a genotyping and IT company with a successful 12-year history of providing gene analysis services to small and medium-sized plant breeding programs. The BecA-ILRI Hub is an appropriate host for the service because of its modern biotechnology laboratory infrastructure, its institutional experience in supporting crop improvement research, its extensive capacity building program, its ability to procure equipment and supplies, and its systems for receiving plant and DNA samples from across Africa under existing agreements with the Kenyan government.

A substantial amount of the IGSS capacity will service NARS breeding programs in sub-Saharan Africa which are supported by the Alliance for a Green Revolution in Africa Program for Africa's Seed Systems (PASS). The truly innovative feature of the service is the provision of detailed guidance on how to apply genomic data to increase their efficiency and success rate to breeding programs. This consulting function will be based on DArT's extensive experience of supporting both private and public-sector breeding programs in a range of species in Europe, Australia, and North America.

Key initial applications of the service for new users will include:

- Identification of genes responsible for desirable traits in parent crops or animals and ensuring they are passed on to subsequent generations
- Selection and tracking for key quality, disease, and stress resistance DNA sequences in African staple crops and livestock.
- Prediction of desirable traits that are influenced by multiple genes.
- Quality control for new population formation, ensuring that the correct parents are used
- Quality control for breeder seed production.

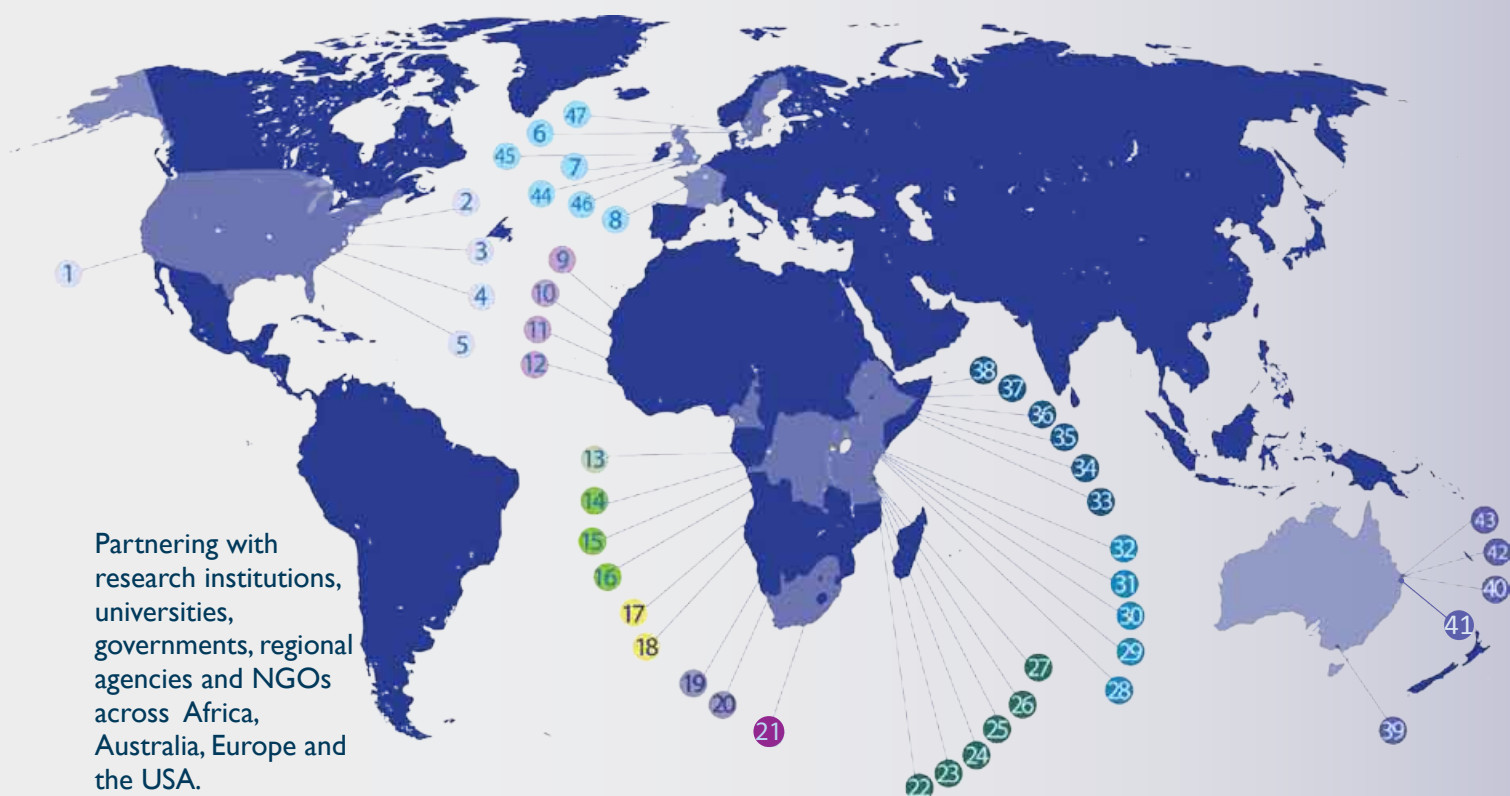
It is planned that the IGSS will evolve into a self-sustaining service within the life of the project. The plant breeding community in Africa will gain an important new tool that is affordable and accessible; the BecA-ILRI Hub will acquire new capacity and provide stronger service to breeding programs in the region; and most importantly, rates of productivity improvement from breeding delivered to smallholder farmers will increase.

The Bill & Melinda Gates Foundation is pleased to support this groundbreaking project. We congratulate the BecA-ILRI Hub and DArT for bringing this innovative public-private partnership to fruition.

I was personally impressed with the leadership shown by the BecA-ILRI Hub team, and the support provided by ILRI management. I look forward to the successful establishment of the service.



# Institutions collaborating directly in core BecA-LRI Hub research projects 2014



Partnering with research institutions, universities, governments, regional agencies and NGOs across Africa, Australia, Europe and the USA.

South Africa   Tanzania   Kenya   Ethiopia   Cameroon   Australia  
 United Kingdom   Sweden   Burundi   Uganda   Rwanda  
 United States of America   France   Democratic Republic of the Congo

1. Colorado State University	19. University of Burundi	37. Ethiopian Wildlife Conservation Authority
2. Donald Danforth Plant Science Center	20. Institut des Sciences Agronomique du Burundi	
3. Cornell University	21. University of Pretoria	38. Amhara Regional Agricultural Research Institute
4. USDA/APHIS/FADDL	22. Tanzania Veterinary Laboratory Agency	39. The University of Melbourne
5. J. Craig Venter Institute	23. Sokoine University of Agriculture	40. University of Queensland
6. Swedish University of Agricultural Sciences	24. Mikocheni Agricultural Research Institute	
7. Food and Environment Research Agency	25. Open University of Tanzania	41. Commonwealth Scientific and Industrial Research Organisation (CSIRO)
8. Institut de recherche pour le développement	26. Nelson Mandela African Institute of S&T	42. The Queensland Government's Department of Agriculture and Fisheries (DAFF)
9. University of Buea	27. Agricultural Research Institute	43. The Queensland Alliance for Agriculture and Food Innovation (QAAFI)
10. University of Dschang	28. University of Nairobi	
11. Small Ruminant Support Programme	29. Kenya Industrial R&D Institute	
12. Institute for Agricultural Research for Development	30. Kenya Agricultural and Livestock Research Organization	44. John Innes Centre
13. Université Evangélique en Afrique	31. Jomo Kenyatta University of Agriculture and Technology	45. University of Cambridge
14. Makerere University	32. Department of Veterinary Services	46. Exeter University
15. NADDEC	33. Tigray Regional Agricultural Research Institute	47. The National Veterinary Institute (SVA)
16. National Agricultural Research Organization	34. South Regional Agricultural Research Institute	
17. Rwanda Agricultural Board	35. Ethiopian Institute of Agricultural Research	
18. Kigali Institute of Science and Technology	36. Holetta Research Center	

\* This illustration only represents a subset of the many partners that the BecA-ILRI Hub is involved with in research and capacity building activities.





*Scientists from across the globe visit a smallholder mixed farm in central Kenya during the Agricultural Research Connections workshop. The farm visits enable scientists to contextualize the challenges faced by smallholder farmers in sub-Saharan Africa (photo: BecA-ILRI Hub\Marvin Wasonga).*



## Building partnerships to advance regional research

The BecA-ILRI Hub's emphasis on building partnerships with science and development partners including private sector partners continues to raise the impact of biosciences on African communities and increase interaction with and support of biosciences networks and 'communities of practice', including those formed amongst the BecA-ILRI Hub/ABCF alumni and regional programs. Collaborations with key scientists and institutions within Africa and across the globe have also facilitated the mentoring of a larger number of early career African scientists.



*Roger Pelle (right) during a site visit of the upcoming biotechnology facility at University of Dschang, Cameroon (photo: University of Dschang).*

### Supporting molecular biology research at Gulu University, Uganda

The BecA-ILRI Hub carried out a mission to operationalize a new biotechnology laboratory at the Gulu University in northern Uganda. The exercise was led by the BecA-ILRI Hub's Capacity building Senior scientist and included the installation of bioscience equipment, and staff training in equipment operation and maintenance by a team of engineers from ILRI. This laboratory will support the human medicine, veterinary medicine, plant science and basic sciences faculties of the university.

The purchase of the equipment for the laboratory had been funded by a grant of USD 784600.00 from the World Bank and Government of Uganda channeled through the Uganda National Council for Science and Technology Uganda- Millennium Science Initiative program. The proposal to acquire these funds had been written in 2009 with the support of the BecA-ILRI Hub. The long-term Gulu-BecA partnership is a success story that demonstrates BecA-ILRI Hub's role of supporting



*Participants of a diagnostics workshop held in collaboration with IRD and Colorado State University (photo: BecA-ILRI Hub \Marvin Wasonga).*



and strengthening the capacity of African NARS to deliver on their mandate.

### Enhancing biosciences research facilities in Dschang, Cameroon

On behalf of the BecA-ILRI Hub, a senior ILRI Biosciences scientist conducted a needs assessment visit to the University of Dschang in Cameroon. The visit established the best approach to supporting the institution's current efforts to improve its biotechnology teaching and research facilities, and contributed to the design of the facility. The support from the BecA-ILRI Hub will include donation of equipment, training of staff in equipment maintenance and technical advice in the upgrade research facilities for the benefit of a wider research community.

### Identifying capacity building needs in Rwanda

The BecA-ILRI Hub technology manager and a senior scientist visited Rwanda to evaluate the country's agricultural bioscience priority needs as well as identify potential areas for collaboration with the national agricultural research institution Rwanda Agricultural Board (RAB). Discussions with the institution's Deputy Director General identified several key areas including plant and animal diseases diagnosis; tissue culture and transformation of the country's major root crops; training in integrated plant breeding, plant pathology (mycology and virology), and integrated plant diseases management; food

### Catalyzing connections for research through the Agricultural Research Connections workshops

Each year since 2009, the BMGF funded ARC workshops have brought together over 150 high-caliber scientists based within and outside of sub-Saharan Africa to catalyse new research partnerships that can compete for funding through calls for proposals to improve agricultural productivity in Africa.



*Kathy Kahn from BMGF connects with Robert Amayo, a plant pathologist from the National Semi-Arid Resources Research Institute (NaSSARI) in Uganda during the Agricultural Research Connections (ARC) workshop in 2014 (photo: BecA-ILRI Hub \ Marvin Wasonga).*

The workshops have enabled scientists from sub-Saharan Africa connect with scientists from other parts of Africa, Europe, USA, South America, Australia and Asia with similar interests, and this has resulted in the creation of new, exciting research partnerships.

It is at one such workshop that Richard Echodu from Gulu University, Uganda made the connection with Prof. Hideaki Tsutsui from University of California, Riverside. The connection led to the successful application for

funds from the Program for Emerging Agricultural Research Leaders (PEARLs) grant. The project will develop simple, low-cost diagnostic tools to detect the sweet potato virus. The tools, which will be adopted to suit resource-limited settings in research facilities across Africa, will facilitate effective disease management and production of virus-free planting materials for the sweet potato, an important crop for food security in Sub-Saharan Africa.



*The set up of the biotechnology laboratory at the Gulu university which will be used for Richard Echodu's research on sweet potato. The facility was equipped with assistance from the BecA-ILRI Hub (photo: BecA-ILRI Hub \ Wellington Ekaya).*

safety and nutrition research on groundnut, maize and rice; climate change and adaptation in relation to performance in milk, meat and egg production; animal genetics and diversity studies; molecular characterization of genetic materials from gene bank; resource mobilization; animal feed and feeding research; and procurement of laboratory supplies.

### Making game-changing continental research connections

Through two major partnership brokerage events – the Agriculture Research Connections Workshops held in June, the BecA-ILRI Hub brought together 150 scientists from Africa, Europe, USA, South America, Australia and Asia to foster scientific collaborations that will address challenges faced by African farming families in crop production. The emerging networks between continentally based researchers and international

scientists have supported African scientists in competing for funding through various proposals calls, including the Program for Emerging Agricultural Research leaders (PEARLs), Basic Research to Enable Agricultural Development (BREAD) and the Sustainable Crop Production Research for International Development (SCPRID).

### A new research and capacity building alliance with the John Innes Centre, UK

The signing of a memorandum of understanding with the John Innes Centre (JIC) in UK and the BecA-ILRI Hub opened access to new capacity building, resource mobilization and technology transfer activities. As an early activity in the BecA-ILRI Hub/JIC alliance, a group of African, BecA-ILRI Hub and JIC researchers are planning to work together to identify useful molecular markers to accelerate bean breeding for disease resistance and other traits.

This undertaking was prioritized in response to breeding programs' needs identified by researchers in Rwanda and Kenya.

### Exchanging technology and knowledge with NM-AIST, Tanzania

An agreement on joint capacity building, technology and knowledge transfer with the Nelson Mandela African Institute of Science and Technology (NM-AIST), enabled the BecA-ILRI Hub to conduct the annual training workshop on laboratory management and equipment operations at NM-AIST. It is the BecA-ILRI Hub's vision that various strategic research centres in the region have the infrastructural capability and the human resource necessary to conduct cutting edge biosciences research and related training over time.

### Innovation through collaboration with USA and France

In partnership with the Colorado State University and the Institut de Recherche pour le Développement (IRD) the BecA-ILRI Hub diagnostics platform developed a Loop-mediated isothermal amplification (LAMP) assay for rice bacterial leaf blight. The team has created and validated four sensitive tests to detect *Xanthomonas oryzae* *Pathovars* in rice. These assays will benefit seed and quarantine officers and allow early on-field detection of the bacterial contamination and are being used in many other diagnostics projects conducted at the BecA-ILRI Hub.



Scientists from John Innes Centre (JIC), UK visit the BecA-ILRI Hub in Nairobi August 2014: Left - Oluwaseyi Shorinola (PhD student in Uauy research group, JIC); 4th left - Cristobal Uauy (group leader, JIC); 3rd right - Brande Wulff (group leader, JIC); 2nd right - Tilly Eldridge (PhD student in Coen research group, JIC) (Photo: BecA-ILRI Hub/Agnes Mburu).

## Engaging with the BecA-ILRI Hub investors



**Front row:** 2nd Left - Aggrey Ambali; Centre - Yemi Akinbamijo; 2nd Right Theresa Sengooba; Right - Eugene Terry (Advisory Panel Chair) **Back row:** 2nd left - Appolinaire Djikeng (Advisory Panel Secretary); Centre - Abdourahamane Sangare; 2nd Right - 3. Edwin Southern; Steve Kemp (Representing panel member Vish Nene); **Also in the picture** are ILRI Director General, Jimmy Smith (back row, left) and BecA-ILRI Hub Technology Manager, Josephine Birungi (front row, left); **Not in the picture:** Advisory panel member HE Tumusiime Rhoda Peace (photo: ILRI\Paul Karaimu).

### The maiden Advisory Panel meeting

Drawing from past achievements and lessons learned over the first decade of operation, constituting an advisory panel to provide strategic advice on future research directions,

new technology developments, potential science and development partners and resource mobilization opportunities for the BecA-ILRI Hub had been identified as an immediate need.

**The BecA-ILRI Hub Advisory Panel, which comprises policy leaders and leaders in biosciences in Africa and internationally will provide a forum for greater interaction amongst African stakeholders including governments and regional bodies, and international science and development partners and investors**

The BecA-ILRI Hub Advisory Panel had its inaugural meeting in May 2014. The Panel, which comprises leaders in biosciences in Africa and internationally will steer BecA-ILRI Hub's efforts in strengthening existing science and development partnerships, as well as catalyze the formation of new ones to facilitate translation of research results into innovations of benefit to farmers and other private enterprises in Africa. The panel will also provide a forum for greater interaction amongst African stakeholders including governments,

regional and sub-regional bodies, and international science and development partners and investors.

Members of the first BecA-ILRI Hub advisory panel include the chair, **Dr Eugene Terry**, Senior Technical Adviser of TransFarm Africa; **HE Tumusiime Rhoda Peace**, Commissioner for Rural Economy and Agriculture at the African Union; **Dr Yemi Akinbamijo**, Executive Director of Forum for Agricultural Research in Africa (FARA); **Prof Sir Edwin Southern**, Founder Chairman and Chief Science Advisor, Oxford Gene Technology; **Dr Aggrey Ambali**, Advisor and Head of Policy Alignment and Policy, NEPAD Science and Technology Innovation Hub (NSTIH), who serves on the panel as NEPAD's representative; **Dr Theresa Sengooba**, Regional Coordinator/



# The BecA-ILRI Hub Advisory Panel and Donors' meeting

Collaborator, International Food Policy Research Institute (IFPRI) Kampala office and chair of the Bio-Innovate Technical Advisory Committee; **Prof Abdourahmane Sangare**, Biotechnology and Biosafety Program Manager, Conseil Ouest et Centre Africain pour la Recherche et le Développement agricoles/West and Central African Council for Agricultural Research and Development (CORAF/WE CARD); **Dr Vish Nene**, Director of the Vaccine Biosciences program at ILRI and ILRI's representative to the panel; and **Dr Appolinaire Djikeng**, Director, BecA-ILRI Hub who serves as the panel secretary).

## The third BecA-ILRI Hub donors' meeting

In tandem with the inaugural advisory panel meeting in May was the gathering of all the BecA-ILRI Hub's current and prospective donors. Having the two groups of stakeholders present as well as research partners, created an opportunity, to appraise both groups of highlights of the BecA-ILRI Hub's growth and transformation since 2009 and the progress that has been made towards the implementation of the 2013-2018 Business Plan. The meeting also enabled a vibrant discussion on how the BecA-ILRI Hub's relevance and financial growth can be sustained through more synergized investment and strategic support.

The members of the BecA-ILRI Hub Donor group present for the joint meeting included **Dr Kathy Kahn**, Senior Program Officer, Bill & Melinda Gates Foundation (BMGF); **Dr Gity Behravan**, Senior Research Advisor,

Swedish International Development Cooperation Agency (Sida); **Dr Paul Greener**, Agricultural Productivity and Markets Specialist and **Mr Joe Manteit**, Australian Department of Foreign Affairs and Trade (DFAT); **Dr Mike Robinson**, Chief Science Advisor, Syngenta Foundation For Sustainable Agriculture;

**Dr Peggy Oti-Boateng**, Senior Program Specialist, United Nations Educational, Scientific and Cultural Organization (UNESCO); **Dr Sheikh Ahmed**, Regional Coordinator, African Development Bank (AfDB); and **Dr Pascal Sanginga**, Senior Program Specialist, Agriculture and Food Security, International Development Research Centre (IDRC).

## Confirming donors' confidence

The BecA-ILRI Hub has enjoyed renewed support for its mission of enhancing the capacities for researchers, research institutions and universities in Africa to use bioscience technologies and innovations in helping farmers improve their productivity and income. The transition into a new phase of funding with early donors has reaffirmed their confidence in the BecA-ILRI Hub's track record and ability to deliver on its mission.

The anticipated Australian government investment of AU\$ 20.2 million over four years from 2015 saw the launch of the Africa Agricultural Productivity Partnership (AAPP) between CSIRO and the BecA-ILRI Hub and the promise of a broader BecA-Australia partnership. The AAPP builds on the success of the preceding BecA-CSIRO partnership which came under the Africa Food Security

Initiative (AFSI) program and run from 2009-2014. Through the enhanced partnership, the BecA-ILRI Hub and CSIRO are focused on engaging with collaborations with researchers; private and public sectors; farmers; and civil society that will enable the adoption of innovations produced by the bioscience activities and facilitate the direct impact of research results on women's capacity.

The initial support from BMGF for the development of the BecA-ILRI Hub's Business Plan; the exploration of the potential of its core programs; and the establishment of a mechanism through which the competitive PEARLS grant is delivered, culminated in new funding aimed at providing additional program support. The Program Support Grant of USD 12.5 million to be funded jointly with the Department for International Development (DFID) over four years will strengthen the BecA-ILRI Hub's capacity to connect NARS scientists to global research partners through various alliances with international agricultural research institutions and universities.

In addition, BMGF have committed to fund a new, innovative program that will enable the upgrading of the BecA-ILRI Hub's genomics platform and associated bioinformatics capabilities to support plant and livestock breeding in Africa. The IGSS which will receive funding of USD 9.75 million over five years will provide access to advanced competencies in highly efficient, cost-effective genotyping alternatives, including genotyping-by-sequencing (GBS) that will greatly accelerate plant breeding and the march toward food and nutritional security in Africa.

## The BecA-ILRI Hub Advisory Panel, 2014



**Dr Eugene Terry**  
**(Advisory Panel Chair)**

Senior Technical Adviser of  
TransFarm Africa



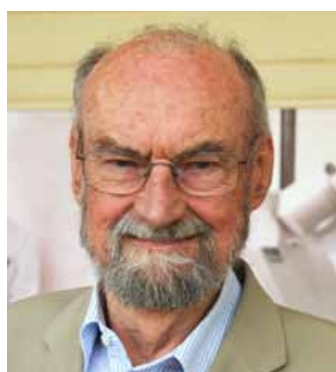
**H.E Tumusiime Rhoda  
Peace**

Commissioner for Rural  
Economy and Agriculture at  
the African Union



**Prof Aggrey Ambali**

Advisor and Head of Science,  
Technology and Innovation  
Hub (NSTIH) at the New  
Partnership for Africa's  
Development (NEPAD) Agency,



**Professor Sir Edwin  
Southern**

Founder Chairman and Chief  
Science Advisor, Oxford  
Gene Technology



**Dr Theresa Sengooba**

Senior advisor to the Program  
for Biosafety system (PBS),  
a program hosted by the  
International Food Policy  
Research Institute (IFPRI)



**Prof Abdourahamane  
Sangaré**

Manager, Biotechnology and  
Bio-security Program of the  
West and Central African  
Council for Agricultural  
Research and Development  
(CORAF/WECARD)



**Dr Vish Nene**

Director, Vaccine Biosciences  
program at ILRI



**Dr Yemi Akinbamijo**

Executive Director of Forum  
for Agricultural Research in  
Africa (FARA )



**Dr Appolinaire Djikeng**  
**(Advisory Panel  
Secretary)**

Director of the BecA-ILRI Hub

## Sharing the BecA-ILRI Hub vision with visitors, 2014



*Vincent Nteziryayo from the University of Burundi explains his research at the BecA-ILRI Hub on domesticating wild forest mushrooms to H.E Fulgence Ndayishimiye, Ambassador of the Republic of Burundi in Kenya (photo: ILRI\Samuel Mungai).*



*Netsanet Zergaw, ABCF fellow from Ethiopia, explains her research on indigenous goat populations to Dr Pamela Anderson, Director Agricultural Development, Bill & Melinda Gates Foundation (photo: BecA-ILRI Hub\ Ethel Makila).*

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**The BecA-ILRI Hub was privileged to host over 500 visitors including policy makers, private sector leaders, donors, scientists, journalists and students**

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In 2014, the BecA-ILRI Hub was privileged to host over 500 visitors. Visitors included policy makers, private sector leaders, donors, scientists, journalists and students from Africa, Australia, Europe, and the USA.

In March 2014, His Excellency Fulgence Ndayishimiye, Ambassador of the Republic of Burundi in Kenya and Mr Jean Baptiste Ciza, Second Counsellor, Embassy of the Republic of Burundi in Kenya visited the BecA-ILRI Hub. Their visit was inspired by their meeting with three research fellows from Burundi who were conducting research under the ABCF fellowship program. The three, Gedeon Nsabiyumva from Burundi Agronomic Sciences Institute (ISABU) conducting research that addresses toxic postharvest maize contamination in Burundi; Vincent Nteziryayo, assistant researcher at the University of Burundi focussing on the characterization and domestication of nutritious saprophytic wild edible mushrooms to promote income generation

and access to nutritious food in smallholder farming communities; and Constantin Nimbona, researcher at ISABU conducting studies that address the issue of cattle tick borne diseases, were able to elaborate on their research and the technologies available for use by researchers from Burundi and other countries in Africa.

Mr Andrew Hurst, Deputy Director for the Pan-Africa Regional Program, Foreign Affairs, Trade and Development Canada also visited in March to discuss the contributions the Hub is making to the growth and development of agriculture in the region and tour the facilities. In April, Dr Pamela Anderson, Director Agricultural Development, BMGF visited the BecA-ILRI Hub as part of an institutional visit to ILRI. During her visit, she sat through a series of presentations on the institution's approach to developing livestock vaccines, diagnostics and livestock productivity in SSA and on the BecA-ILRI Hub core activities.



## Visitors to the BecA-ILRI Hub



Florence Munguti ABCF fellow from Kenya, explains her work to Adam McCarthy the DFAT Assistant Secretary, Africa Branch (photo: BecA-ILRI Hub\Marvin Wasonga).

Dr Anderson also took a tour of the facilities during which she interacted with various African NARS scientists conducting their research under the ABCF fellowship program. In July, Mr Adam McCarthy, the Australian Government Department of Foreign



The delegation from the University Gon Coulibaly Peleforo Korhogo, Côte d'Ivoire led by Parfait Kouakou (left) during a courtesy call to ILRI Directorate. In the picture are Iain Wright (3rd left), ILRI Deputy Director General, and Ethel Makila (right) Communications Officer, BecA-ILRI Hub (photo: ILRI\Samuel Mungai).

Affairs and Trade (DFAT) Assistant Secretary, Africa Branch, visited the BecA-ILRI Hub to discuss the team's engagement with DFAT through the BecA-CSIRO Partnership. In November, the Cameroon Minister for Livestock Fisheries and Animal

Industries, Dr Taiga, visited the BecA-ILRI Hub and was able to learn more about the collaborative research activities between the BecA-ILRI Hub and Cameroon as well as see the technologies available for use by Cameroon scientists.

### Other visitors to the BecA-ILRI Hub included:

Visitor's name	Institution
Delegation led by former ABCF fellow Parfait Kouakou and comprising Soro Yadé René; Soro Sibirina; Djane Kabran Aristide; and Balle Ségbé Guy-Romarc	University Gon Coulibaly Peleforo Korhogo, Côte d'Ivoire
Delegation led by Edwin Southern, Founder Chairman and Chief Science Advisor, Oxford Gene Technology and including Robert Koebner, Paul Gepts, Emma Wilmore, and Fleur Geoghegan	The Kirkhouse Trust, UK
Gary Atlin, Senior Program Officer	Bill & Melinda Gates Foundation (BMGF)
Kathy Kahn, Senior Program Officer	Bill & Melinda Gates Foundation (BMGF)
Gity Behravan, Senior Research Advisor	Swedish International Development Agency (Sida)
Louisa Cass, First Secretary, Food Security	Australian Department of Foreign Affairs and Trade
Nighisty Ghezze, Head of Program	International Foundation for Science (IFS)
Wanjiru Kamau-Rutenberg, Director	African Women in Agricultural Research and Development (AWARD)
Paul Greener, Agricultural Productivity and Markets Specialist	Australian Department of Foreign Affairs and Trade

## Visitors to the BecA-ILRI Hub



A delegation from NEPAD Nigeria visited the BecA-ILRI Hub in September 2014 on a learning/benchmarking visit. Their interest key interest was to see how the BecA-ILRI Hub as an initiative of NEPAD operates and how the activities align to Kenya's vision 2030, and other national agricultural development priorities in the region (photo: BecA-ILRI Hub\Marvin Wasonga).

Visitor's name	Institution
Tesfaye Legesse, Senior Program Manager	Australian Department of Foreign Affairs and Trade
Mike Robinson, Chief Science Advisor	Syngenta Foundation For Sustainable Agriculture
Peggy Oti-Boateng, Senior Program Specialist	United Nations Educational, Scientific and Cultural Organization (UNESCO)
Eugene Terry, Senior Technical Adviser	Transform Africa
Yemi Akinbaminjo, Executive Director	Forum for Agricultural Research in Africa
Aggrey Ambali, Advisor and Head of Policy Alignment and Policy	NEPAD Science and Technology Innovation Hub (NSTIH)
Theresa Sengooba, Regional Coordinator/Collaborator	International Food Policy Research Institute (IFPRI) Kampala office
Abdourahamane Sangare, Biotechnology and Biosafety Program Manager	CORAF/WECARD
Delegation comprising Paloma Fernandez, CEO, CMA ; Diamond Lalji - Chairman, Premier Flour Mills	Kenya Cereal Millers Association (CMA)
Anna Dorney, Counsellor, Development Cooperation	Australian High Commission in Kenya
Jamie Isbister, Head of Department of Foreign Affairs and Trade in Africa	Australian Department of Foreign Affairs and Trade
Dr. Brande Wulff, Group Leader	John Innes Centre (JIC), UK
Professors Alice Mweetwa, Evans Kaimoyo and Langa Tembo	University of Zambia
Andrzej Kilian, Director	Diversity Arrays Technology Pty Ltd, Australia
Peter Carberry, Group Leader and Justin Harsdorf, Business Manager, Sustainable Agriculture Flagship Program	Commonwealth Scientific and Industrial Research Organisation (CSIRO);
Roger Freedman and Diana Horvath, Chairman and President/Director	The 2Blades Foundation, UK





Capacity Building Officer, Valerian Aloo gives information on the opportunities available at the BecA-ILRI Hub during the Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA) 2nd General Assembly, 9 Dec 2014 - Bujumbura, Burundi (photo: BecA-ILRI Hub\Ethel Makila).



## Raising the profile of the BecA-ILRI Hub

The BecA-ILRI Hub communication and outreach strategy has ensured an increasing visibility, awareness of both activities outputs and related opportunities for development outcomes and impacts across Africa and internationally. The strategy has leveraged on regional, continental and international engagements; visits to the BecA-ILRI Hub; engagements with key institutions and individuals; as well as endorsement and advocacy by former ABCF fellows and workshop participants.



Appolinaire Djikeng, the BecA-ILRI Hub Director, gives a keynote presentation on the opportunities and challenges of food security in Africa at the Annual Bioforsk Conference organized by Bioforsk, Norwegian Institute for Agricultural and Environmental Research in Hamar, Norway (5 Feb 2014) (photo: Bioforsk/Morten Günther).



The current and alumni research fellows play a key role in raising the profile of the BecA-ILRI Hub through participation in regional, sub-regional and international conferences as well as by giving presentations at their home institutions. During the 6th All African Conference on Animal Agriculture in October 2014, Getinet Mekuriaw from Addis Ababa University in Ethiopia gave a presentation based on his research that is contributing to the BecA-ILRI Hub's research project on goats (photo: BecA-ILRI Hub/Marvin Wasonga).

The BecA-ILRI Hub's key activities of crop and animal research as well as capacity building, have been featured extensively in regional and international media through news articles and feature stories like **Meet Maasai grass, the wonder fodder** featuring Brachiaria in the *Daily Nation*; **When the Grass is Greener: Maasai in Kenya Swap a Nomadic Existence for Farming** featuring Brachiaria in *Think Africa Press* both in English and Swedish; **More funds are needed to address malnutrition** featuring the aflatoxin research and the plant breeding academy in the *Daily Nation*; **How nutritionist got supermarkets to stock amaranth** featuring the amaranth project's SME partner Ann Muthoni in the *Business Daily*; **Comment réussit son élevage de chèvres** about the activities of the goat project taking place in Cameroon in *Afrique Agriculture*; **The planet needs more plant scientists**, featuring a workshop for African educators developing educational tools for a next generation of African plant breeders hosted by the BecA-ILRI Hub in the Australian Centre for International Agricultural Research (ACIAR) website and *WorldNews.com*; and an article about a presentation given by the BecA-ILRI Hub Director Appolinaire Djikeng at the Bioforsk conference in Norway in *Bedre Gardsdrift*, a Norwegian

agricultural magazine among many others.

Other updates featuring the progress and impact research and capacity building activities have been disseminated even wider through social media networks on **Facebook**, **twitter** and **blog**.

The collaboration with the African Women in Agricultural Research and Development (AWARD) fellowship program was highlighted during the visit of the newly appointed Director, Dr. Wanjiru Kamau-Rutenberg. This collaboration has facilitated the increased support of women scientists from the eastern and central Africa region and beyond in biosciences research for development.

Participation in international and regional conferences that helped raise the profile of the BecA-ILRI Hub as an African centre of excellence in biosciences research and training included presentations given at the 22nd International Plant and Animal Genome Conference (PAG XXII) in San Diego-USA, the Molecular Plant-Microbe Interaction conference in Greece and the American Phytopathological Society- Canadian Phytopathological Society (APS-CPS) Joint Meeting in Minneapolis-USA; a keynote presentation on Food

Security in Africa given at the Annual Bioforsk Conference organized by Bioforsk, Norwegian Institute for Agricultural and Environmental Research in Hamar, Norway and at the Canadian International Food Security Research Fund (CIFSRF) High Level Dialogue organized by the Canadian International Development Research Centre (IDRC) in collaboration with AGRA; a seminar at the Sainsbury Laboratory seminar highlighting collaborative opportunities to engage with African agricultural science through the BecA-ILRI Hub; a presentation on the opportunities at BecA given during the Agricultural-Research-for-Development (AR4D) Network Consultative Roundtable and the Comprehensive Africa Agriculture Development Program (CAADP) Partnership Platform (PP) in Durban, South Africa; participation at an international workshop to chart a roadmap for the surveillance and diagnosis of cassava diseases held in La Reunion; and participation in the Partnership for Aflatoxin Control in Africa (PACA) Partnership Platform meeting in Addis Ababa.



*Bioinformatician Joyce Nzioki gives technical support to participants of a bioinformatics workshop conducted in Khartoum, Sudan. By hosting workshops in different countries in the region, the BecA-ILRI Hub has been able to increase awareness of activities and opportunities available to NARS researchers (photo: BecA-ILRI Hub).*

### Positioning the BecA-ILRI Hub as a leading capacity building partner in cassava disease surveillance and diagnostics

The BecA-ILRI Hub participated in a meeting convened to establish the first steps needed implement a global action plan to fight cassava viruses. The meeting held on the Island of La Reunion in June 2014 was attended by Communication Officer, Ethel Makila.

During the meeting, Ethel made a presentation on the capacity building opportunities at the BecA-ILRI Hub and chaired the working group on training and capacity building. The working group explored opportunities for collaborative capacity building activities by members of the cassava surveillance network spanning central, eastern, western and southern Africa and the Indian Ocean region.

Of particular interest to the conference participants was the BecA-ILRI Hub's model of convening workshops with expert trainers drawn from various institutions all over the world and an in-built participant action plans that ensure onward transfer of skills acquired at trainings.

At the conclusion of the meeting, the alliance proposed the BecA-ILRI hub as a key partner in the capacity building activities to be carried out in eastern and central Africa and further received an invitation to be a part of the World Congress on Root and Tuber Crops to be held in China in October, 2015.



*The BecA-ILRI Hub communication officer Ethel Makila (right) takes part in a field visit the collection of Reunion cassava landraces at the Plant Protection Platform (3P Cente) in St Pierre - La Réunion (photo: Jean-Michel Lett).*



# Highlight of 2014 – BecA-ILRI Hub scientist appointed Rwanda Minister of Agriculture and Animal Resources



*BecA-ILRI Hub scientist Gerardine Mukeshimana (centre) poses with Rwandan President HE Paul Kagame after her ministerial appointment (photo: Rwanda Government).*

One of the most exciting moments for the BecA-ILRI Hub in 2014 was the appointment of scientist Gerardine Mukeshimana as Minister for Agriculture and Animal Resources, Republic of Rwanda. Until her appointment, Mukeshimana was a key scientist leading efforts toward understanding the genetic and biochemical basis of plant disease resistance and susceptibility focussing on beans, an important food commodity in SSA.

After the news of her appointment, the ILRI Director General, Jimmy Smith pledged the institution's readiness to support her in her new role while the BecA-ILRI Hub Director Appolinaire Djikeng termed her appointment as being a testament to the importance of the work done at the BecA-ILRI Hub and the caliber of the people the

Hub attracts to contribute to fulfilling its mission of achieving food security in Africa.

Mukeshimana's passion to make food and nutritional security in Africa a reality has resulted in her recognition for international awards. In 2012, she was acknowledged by the United States Agency for International Development's (USAID) Board for International Food & Agriculture Development (BIFAD) for her significant contributions to the breeding of the common bean for drought tolerance and disease resistance. She also received a Norman Borlaug Leadership Enhancement in Agriculture Program (Borlaug LEAP) fellowship for her contributions to breeding of the common bean, which enabled her PhD research in plant breeding, genetic, and biotechnology

at Michigan State University, USA and CIAT in Cali, Colombia.

Mukeshimana expressed optimism about future collaboration with the BecA-ILRI Hub to contribute to enhanced agricultural productivity, income, and food and nutritional security in Rwanda through improved research capacity.

To date, over 20 researchers from Rwanda have benefited from workshops conducted by the BecA-ILRI Hub in collaboration with its capacity building partners; seven NARS researchers have been hosted to conduct research at the Hub; and the Rwanda Agricultural Board is a national partner in the BecA-led project to improve the quantity and quality of forages in the livestock industry in East Africa.





*Farmers compare notes during a variety selection exercise organized by the BecA-ILRI Hub Brachiaria grasses research team at the Kenya Agricultural and Livestock Research Organization station in Katumani, eastern Kenya (photo: ILRI/Samuel Mungai).*



## Growing the BecA-ILRI Hub team to meet with regional demands

The BecA-ILRI Hub's team of core scientific staff and technical staff continues to grow to meet with the increased demand stemming from a growing research and capacity building portfolio. In 2014, the BecA-ILRI Hub recruited diverse skills:



*The BecA-ILRI Hub team during a staff planning and team-building retreat in 2014*

### Improving procurement efficiency

*Monicah Njuguna, BecA-ILRI Hub's procurement assistant*



The concept of having a dedicated laboratory procurement assistant was borne out of the challenge of providing efficient

services to the growing number of lab users using a central system.

Not only does Monicah facilitate timely procurement of laboratory goods but also ensures quality and cost effectiveness by sourcing from alternative sources and relating cost to specific scientific needs in consultation with the technology manager,

assistant technology manager and lab users.

'I love my job because I can seamlessly use my background in Biochemistry and expertise in procurement,' says Monica, 'I also feel like part of a larger family which I must support to achieve collective goals.'

'My greatest challenge though has been matching the speed of delivery with client needs and keeping the cold chain particularly for imported items.'

'Overall, my first year has been a wonderful mixture of challenge and learning flavored with friendly colleagues.'

- **Josephine Birungi (Principal Scientist, Technology Manager)**

manages laboratory operations, research facilitation and research related services, application and monitoring of new technologies, and leading the BecA-ILRI Hub's genomics and bioinformatics efforts. She brings in expertise and wide experience in laboratory design/setup and management, genetics and genomics.

- **Franklin Simtowe (Monitoring, Evaluation and Learning Senior Scientist)**

leads the BecA-ILRI Hub's Monitoring, Evaluation and Learning. He brings over 15 years' experience in of policy research and advocacy in Southern, Eastern and Western Africa regions.

- **Wellington Ekaya (Capacity Building Senior Scientist)**

is responsible for capacity building

strategy development, managing the ABCF fellowship program, partnership engagement and mentorship of research fellows. He comes with wide experience in capacity building and program management.

- **Monicah Njunguna (Procurement Assistant)** ensures efficiency of the procurement process within the research platform. She brings to the BecA-ILRI Hub a wealth of experience in procurement of laboratory equipment and consumables, and logistics gained from the medical, government, private sector and NGO field.

- **Collins Mutai (Research Technician)** supports the 'Climate-smart Brachiaria grasses for improving livestock production in East Africa' project. He has experience in molecular characterization of vector-borne viruses (arboviruses) of medical and veterinary importance including outbreak investigation, routine surveillance and vector biology.

- **Julius Osaso (Diagnostic Platform Manager)** is responsible for the training and supervision of students, visiting scientists and other partners on the application of assays developed at the diagnostics platform. He has extensive experience in research; lab management; and support training and applications support on many life science instruments/reagent products.

- **Marvin Wasonga (Administrative Assistant)** provides operations and logistical support to the capacity building program and to the BecA-ILRI Hub in general. He holds a BSc. in Project Planning and Management and a post-graduate certificate in Monitoring and Evaluation.

- **Frederick Ng'ang'a (Research Technician):** is a gas chromatography-mass spectrometry trainer and highly experienced in the application and operation of various advanced analytical instruments. He brings

experience in instrumental analysis of biochemical compounds in coffee and pesticides formulations to support the BecA-ILRI Hub's aflatoxin project.

- **Mary Wambugu (Technical Support Coordinator - Integrated Breeding Platform)** is a point of contact for crop breeders within the region in providing technical backstopping in the use of the IBP manager software at the BecA-ILRI Hub. She brings experience in the design, planting and management of nurseries, data capture, data management and analysis.

- **Titus Kathurima (Research Technician)** provides high level technical support and conducts training on the use of the platform. He brings to the BecA-ILRI Hub experience in biotechnology research on virus diversities and development of diagnostic assays.

This staff expansion has significantly enhanced the team's range of expertise and capacity to serve the region.

## 'Growing up' at the BecA-ILRI Hub

*Francesca Stomeo, scientist in the capacity building program reflects on her journey from post-doc to scientist*



Being a post-doc at the BecA-ILRI Hub is a complete departure from working solely at the bench as I did in my previous post-doc positions.

The words of the current BecA-ILRI Hub Director before I took up the job 'You are joining a mission not just a job' resonated in me every single day as I got involved

in everything from capacity building to service-related activities.

What I liked most about my post-doc job was the opportunity to learn and grow in research and people management. My growth curve has included learning

plant research, supervising research fellows, participating in development of new projects and playing a key role in the establishment of the BecA-ILRI Hub's genomics platform.

Looking into the future, I see this 'mission' helping to establish similar labs in eastern and central Africa that are managed by the scientists that we mentored. BecA is like a mother who helps her children to gain the independence to walk on their own.

I am thankful to every one at the BecA-ILRI Hub for the support, encouragement and mentoring I received in my three years as post-doc, and excited about being a scientist. I look forward to what 2015 will bring as I take on more responsibilities in capacity building activities on the Integrated Genotyping Service and Support and Genomics Platform. *Cheers to the future!*



# The BecA-ILRI Hub Human and financial resources

## The BecA-ILRI Hub staff in 2014

### Scientists

**Appolinaire Djikeng**, Director  
**Franklin Simtowe**, Monitoring, Evaluation and Learning  
**Jagger Harvey**, Plant Molecular Biologist  
**Josephine Birungi**, Technology Manager  
**Leah Ndungu**, Program Coordinator  
**Monday Ahonsi**, Program Coordinator  
**Morris Agaba**, Molecular Genetics  
**Rob Skilton**, Capacity Building Team Leader  
**Sita Ghimire**, Plant Pathology  
**Timothy Holton**, Plant Biotechnology  
**Wellington Ekaya**, Capacity Building Coordinator

### Post-doctoral scientists

**Bombom Alexander Junior**, Plant Genetics  
**Francesca Stomeo**, Genomics  
**Gerardine Mukeshimana**, Plant Molecular Biology  
**Mark Wamalwa**, Bioinformatics  
**Nasser Yao**, Plant Molecular Breeding  
**Tatjana Sitt**, Molecular Diagnostics

### Research Associates

**Ben Kiawa**, Unit Coordinator, Segolip  
**Collins Mutai**, Brachiaria project  
**David Oyoo Ezra**, Unit Coordinator, Central Core  
**Eunice Machuka**, Capacity Building

**Frederick Nganga**, Aflatoxin Project  
**Immaculate Wanjiru Wanjuki**, Aflatoxin Project  
**Inosters Nzuki**, Segolip Unit  
**James Wainaina**, Aflatoxin Project  
**Leah Kago**, Brachiaria Project  
**Lucy Muthui**, Segolip Unit  
**Martina Kyalo**, Capacity Building  
**Mercy Macharia**, Molecular Diagnostics  
**Moses Ndotono Njahira**, Capacity Building  
**Pauline Asami**, Plant Tissue Culture and Transformation  
**Robert Ngeno**, Analytical Chemist  
**Sarah Osama**, Genetic Diversity  
**Solomon Maina**, Capacity Building  
**Sundy Akello**, Aflatoxin Project  
**Titus Kathurima**, Genomics  
**Wilson Kimani**, Capacity Building

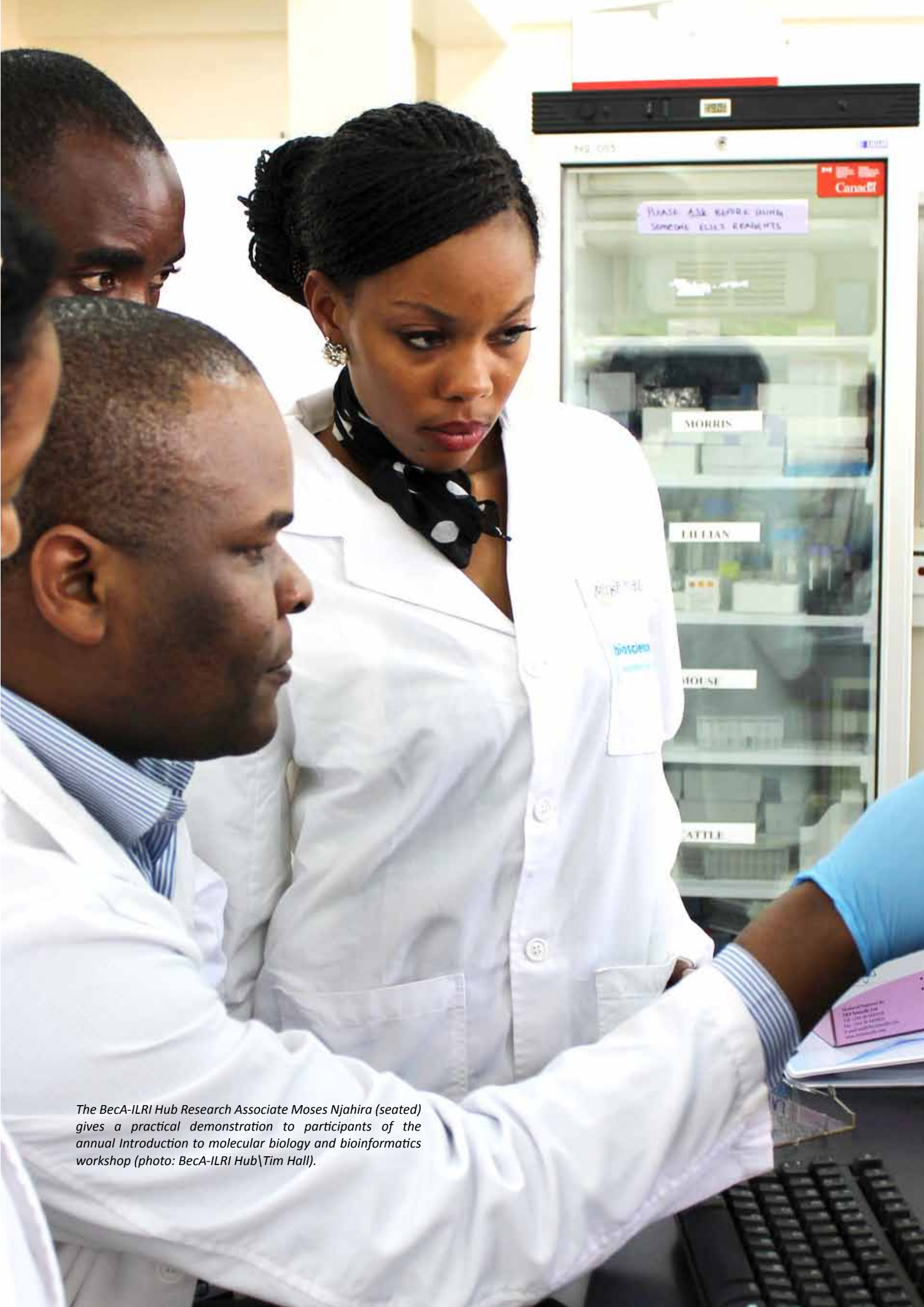
### Technical Support

**Agnes Njeri Mburu**, Technical Management Assistant  
**Cyrus Too**, Greenhouse Supervisor  
**Dalmas Odhiambo Ngere**, General Laboratory Assistant  
**Edwin Isaac Onyiego**, Greenhouse Assistant  
**Evelyn Atieno Onyango**, Technical Assistant, Central Core  
**Francis Gatehi**, General Laboratory Assistant  
**Julius Osaso**, Diagnostic Platform Manager  
**Linnet Agiza**, General Laboratory Assistant

**Manasses Mwaura**, Technical Assistant, Central Core  
**Mary Odiyo**, General Laboratory Assistant  
**Mary Wambugu**, Technical Support Coordinator, Integrated Breeding Platform  
**Michael Ominde**, General Laboratory Assistant  
**Samuel Njoroge**, Technical Assistant, Central Core  
**Timothy Kingori Njoroge**, Assistant Technology Manager  
**Winnie Muoka**, General Laboratory Assistant

### Research Support

**Berine Ada**, Project Accountant  
**Boniface Muganda**, Database Specialist  
**David Barasa**, Program Assistant  
**Dedan Githae**, Bioinformatician  
**Ethel Makila**, Communications Officer  
**Jacqueline Mayira**, Program Assistant  
**Joyce Nzioki**, Bioinformatician  
**Marvin Wasonga**, Administrative Assistant, Capacity Building  
**Monicah Waruinu Njuguna**, Laboratory Procurement Assistant  
**Rachael Mwangi**, Program Management Officer  
**Rachel Njunge**, Senior Administrative Assistant  
**Valerian Aloo**, Capacity Building Officer



*The BecA-ILRI Hub Research Associate Moses Njahira (seated) gives a practical demonstration to participants of the annual Introduction to molecular biology and bioinformatics workshop (photo: BecA-ILRI Hub\Tim Hall).*



# The Africa Biosciences Challenge Fund Fellows in 2014

In addition to scientists from eastern and central Africa, the ABCF program has provided support to self and co-sponsored researchers from beyond the region in their research and development of pilot project in both crop and livestock research.

## BURUNDI

### Vincent Ntezirayo

University of Burundi

*Domestication trials of saprophytic wild edible mushrooms of Burundi: Taxonomy study and nutritional value*

### Gedeon Nsabiyumva

Burundi Agronomic Sciences Institute (ISABU)

*Occurance and distribution of aflatoxin and fumonisim in maize collected at post-harvest in Burundi*

### Constantin Nimbona

ISABU-Mahwa Research Station

Risk factors that influence the distribution of ticks that infest cattle and prevalence of serum antibodies to tick-borne pathogens in Burundi

### Michel Ntimpirangeza

Institut des Sciences Agronomiques du Burundi (ISABU)

Virus discovery and development of a LAMP diagnostic test for Taro-infecting viruses in Burundi

## CAMEROON

### Olivier Fokam

University of Dschang  
Cameroon

*Technical molecular biology as an identification tool for bush meat in the urban markets of Cameroon: stakes, challenges and perspectives*

### Silatsa Assongo Barberine

University of Dschang

*Evaluation of CD8 T-cell antigen Tp2/heat shock fusion protein(Tp2/gp96) delivery system: antigen production and immunogenicity Study*

## DRC

### Aganze Bigabwa Bigman

Institut superieur pedagogique de Bukavu

*MCH polymorphism in indigenous chicken populations in Bukavu, Eastern of DR Congo: population's structure, diversity and distribution*

## ERITREA

### Tesfamichael Abraha

Hamelmal Agricultural College

*Diversity analysis of Eritrean sorghum landraces for drought tolerance using molecular markers*

### Brhan Khia Saleh

Hamelmal Agricultural College

*Evaluation of Eritrean local hot pepper genotypes for diversity using molecular techniques*

### Biniam Mesfin Ghebreslassie

Hamelmal Agricultural College  
Characterization of Eritrean potato genotypes using molecular markers

## ETHIOPIA

### Yemisrach Mulugeta

Addis Ababa University  
*Molecular charactyerization of*

*bacterial and fungal isolates from Enset ventricosum*

### Adey Feleke

Lecturer, Faculty of Life Sciences at the Addis Ababa University in Ethiopia

*Microbial diversity in an experimental tannery wastewater treatment plant in Ethiopia*

### Asmare Dagnew Moges

Ethiopian Institute of Agricultural Research (EIAR)

*Development of microsatellite markers for the genetic analysis of Psuedocercospora angolensis from Ethiopia*

### Daget Ayana Tegegne

Lecturer / Research & Technology Transfer coordinator, Addis Ababa Science and Technology University  
*Metagenomic microbial exploration of thermal vents and hot springs of the Ethiopian rift valley*

### Getinet Mekuriaw Tarekegn

Bahir Dar University, Ethiopia  
*Molecular characterization of indigenous goat breeds of Ethiopia: genetic diversity, DNA profiling and fine mapping of genes of selected traits*

### Goshu Mizganaw

Wondogenet College of Forestry and Natural Resources  
*Bacterial and fungal endophytes of Brachiaria Species from Ethiopia*

## Abel Debebe Mitiku

Ethiopian Institute of Agricultural Research

*In vitro* protocol optimization for virus elimination and multiplication of Garlic (*Allium sativum* L.) 'Bishoftu nich'

## Tadesse Eguale

Aklilu Lemma Institute of Pathobiology

Molecular characterization of drug resistance determinants of *Salmonella* isolates from humans and animals in Central Ethiopia

## KENYA

### Calleb Olweny Ochia

Scientist, Kenya Sugar Research Foundation

Assessment of genetic diversity in sweet sorghum genotypes using SSR markers

### Joshua Amimo

Assistant Lecturer  
University of Nairobi

Molecular epidemiology of selected enteric viruses in swine in east Africa region

### Irene Njagi

Kenya Agricultural and Livestock Research Organization

Development of genetic transformation protocols for Kenyan cassava landraces

### Jane Wamaitha

Kenya Agricultural and Livestock Research Organization

Understanding the genomics of Maize Lethal Necrotic Virus and other potyviruses

## Florence Munguti

Kenya Plant Health Inspectorate Services (KEPHIS)

PCR based diagnostics of passion fruit woodiness disease in support of phytosanitary services

## Fredah Rimbeira

Jomo Kenyatta University of Agriculture and Technology (JKUAT)

Genetic diversity and association mapping of  $\beta$ -carotene production of mango germplasm from Kenya

## Lilian Okiro

Egerton University

Detection of *Ralstonia solanacearum* species by Loop Mediated Isothermal Amplification

## Dorcus Achieng Omoga

Veterinary Research Laboratories  
Improvement of the diagnostic capacity for diseases caused by capripoxviruses

## Carolyn Anaye Omukoko

Chuka University

*Beauveria bassiana* as an endophyte to control red spider mites  
*Tetranychus evansi* in potatoes

## Sheila Okoth

Lecturer/Researcher, University of Nairobi

Characterization of *Aspergillus Flavus* isolates from maize kernel and maize cropped soils from different maize growing regions of Kenya

## Jane Ambuko

University of Nairobi

Molecular and Phytochemical Characterization of Spider Plant Accessions

## Rachel Okeyo

University of Nairobi

Cloning of P5CS gene into *tumefaciens*

## Esther Kanduma

University of Nairobi

Isolation, recombinant expression and generation of anti tick vaccines from a novel secretory-type iron transporting protein Ferritin 2 from *Rhiphalus appendiculatus*

## Nina Wambiji

Research Scientist, at the Kenya Marine & Fisheries Research Institute

Application of next generation sequencing approaches to assess the genetic diversity of Rabbitfish species from Kenya

## James Barasa

State department of Fisheries  
Genotyping of african catfish from Lakes Namoyo and Jipe in Kenya

## Davis Gimode

Kenyatta University

Development of genomic resources for finger millet breeding through transcriptome analysis

## Eric Owuor Mikwa

Kenyatta University

Transcriptome analysis of finger millet at critical stages of *Striga* infestation

## Henry Sila Nzioki

Kenya Agricultural and Livestock Research Organization

Identification, occurrence and distribution of *Brachiaria* diseases in Kenya



**David Odongo**

University of Nairobi

*Molecular cloning and expression of a vaccine antigen against infection with the larval stage of Echinococcus granulosus*

**Naftal Ombogo Ondabu**

Kenya Agricultural Research Institute (KARI) Lanet – Nakuru

*Using multigenetic sequence analysis and genomic fingerprint technologies to characterize Brachiaria grass species ecotypes in Kenya*

**Stephen Indieka Abwao**

Egerton University

*Regeneration and transformation of Kenyan Taro (Colocasia esculenta) cultivars via indirect somatic embryogenesis.*

## RWANDA

**Marie Christine Dusingize**

Animal Sciences and Veterinary Medicine (UR/CAVM) Musanze, Rwanda

*Morphological and genetic diversity of Rwandan brachiaria ecotypes and associated microbial communities*

**Godelieve Mukamurezi**

Rwanda Agriculture Board  
Occurrence and distribution of mycotoxins in grain, case study: aflatoxin in rice from Rwanda  
Occurrence and distribution of mycotoxins in grain, case study: aflatoxin in rice from Rwanda.

**Kizito Nishimiwe**

University of Rwanda

*Molecular and Phytochemical Characterization of Spider Plant Accessions*

## SOUTH SUDAN

**Richard Opi Balli Zozimo**

Ministry of Agriculture, Forestry, Cooperative and Rural Development  
*Genetic diversity analysis of sorghum landraces in South Sudan*

## SUDAN

**Rasha Adam**

Biosafety and Biotechnology Research Centre Agricultural Research Corporation  
*Agrobacterium mediated transformation of sorghum*

**Ali Babiker**

Agricultural Research Corporation  
Assessing the genetic diversity among cowpea to improve productivity using molecular markers

## TANZANIA

**Ibrahim Juma**

University of Dar es Salaam  
*Bioprospecting of wood-based saprophytic edible mushrooms from selected indigenous forest, Tanzania*

**Juma Hussein**

University of Dar es Salaam  
*Bioprospecting of leaf litter and soil based saprophytic wild edible mushrooms from selected indigenous forests in Tanzania*

**Shamsa Salum**

Mikocheni Agricultural Research Institute  
*Development of micropropagation protocols for African baobab*

**Hamza Nassoro Msangi**

Mikocheni Agricultural Research Institute  
*Genotyping of baobab from Tanzania using short sequence repeats and gene-based sequencing*

**Julius Mwanandota**

Tanzania Veterinary Laboratory Agency (TVLA)  
*Improvement of Lumpy Skin Disease control by use of simple and efficient diagnostic tool*

**Ramadhani Juma Lipala**

Mikocheni Agricultural Research Institute (MARI)  
*Screening and sequencing viruses infecting yam in Kagera region in Tanzania*

**Siha Mdemu**

Tanzania Veterinary Laboratory Agency (TVLA)  
*Development and testing of a LAMP assay for control of Contagious Caprine Pleuropneumonia in Tanzania*

**Samson Kilaza Mwaikono**

The Nelson Mandela African Institute of Science and Technology  
*Molecular diversity of bacteria from pigs around dumps and their importance to animal and human health*

## Fabian Manzo

Ministry of Agriculture, Food Security and Cooperatives  
*Quantification of Aflatoxin contamination in hybrid maize varieties produced under optimal and sub-optimal levels of nitrogen and phosphorus fertilizer in Tanzania*

## Elpidius Rukambile

Tanzania Veterinary Laboratory Agency (TVLA)  
*Validation, adoption and adaptation of Loop-mediated isothermal amplification (LAMP) and Reverse line Blot (RLB) tests for diagnosis of important tick-borne diseases (TBD) and Molecular characterization of Theileria parva*

## Benigni Temba

Lecturer, Sokoine University of Agriculture/ PhD Fellow, University of Queensland  
*Mycotoxins and Mycotoxigenic fungi in Maize in East Africa: Surveillance and Characterization*

## UGANDA

### Sandra Kaimenya

Uganda Christian University  
*Developing genomic tools for Solanum aethiopicum breeding and gene discovery*

### Jacinta Akol

National Crops Resources Research Institute  
*Development of tissue culture protocol for production of quality farmer preferred yam planting material*

### Abel Byarugaba Arinaitwe

Research Officer/Plant Pathologist  
National Agricultural Research Organization (NARO)-  
*Regeneration and transformation of two potato varieties from Uganda for resistance to potato late blight disease caused by Phytophthora infestans*

## Clet Wandui Masiga

Program Assistant, ASARECA  
*Gene identification by comparing sorghum genomes from Next Generation Sequence data for improving sorghum adaptation to climate change through novel genes from wild relatives*

## John Walakira

National Fisheries Resources Research Institute-NARO, Kampala, Uganda  
*Developing a SNP panel as tool to determine the genetic diversity and guide domestication of African lungfish*

## An impact of the ABCF fellowship on research in Africa

Impact assessment report by a leading strategy consultancy, Dalberg Global Development Advisors

64%

....of all fellows have had their sponsored research lead to new techniques within their field

63%

....of all fellows have had their sponsored research lead to greater awareness in their field

89%

ABCF contribution

91%

ABCF contribution

*'Through my ABCF-sponsored research I identified useful diagnostic markers for Malignant catarrhal fever (MCF), a devastating cattle disease. I am currently furthering the research to develop a simple, rapid, penside test for detection and control of infection in cattle.'* - ABCF alumni

*'The execution of my research project on Common bean genetic diversity and population structure in Ethiopia is currently used as an important source document for the National Bean Genetic Resource Conservation/Research'* - ABCF alumni

# Statement of income and expense

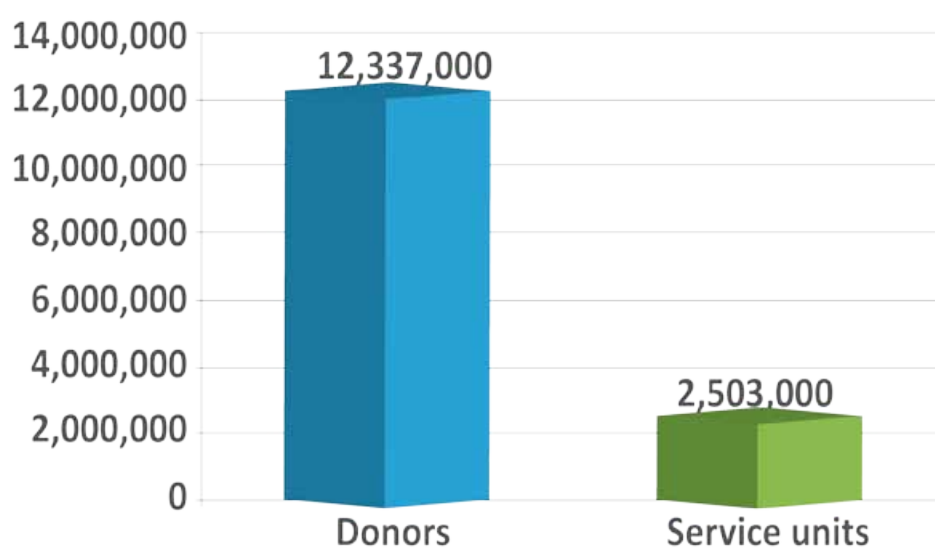
## Income and expense | January - 31 December 2014

	Millions USD	Percentage
Income source		
Donors	12,337	83%
Service units	2,503	17%
Total Income	14,840	100%
Expenditure by activities		
Research projects	6,761	46%
Capacity building	3,685	25%
Lab management and service units operational costs	2,664	18%
BecA asset replacement reserve	764	5%
Program management	966	7%
Total Expenditure	14,840	100%
Expenditure by natural classification		
Personel	3,313	22%
Collaborators/ Partners	1,672	11%
Supplies and services	7,791	53%
Operational travel	311	2%
Depreciation	310	2%
Indirect costs	1,443	10%
Total Expenditure	14,840	100%

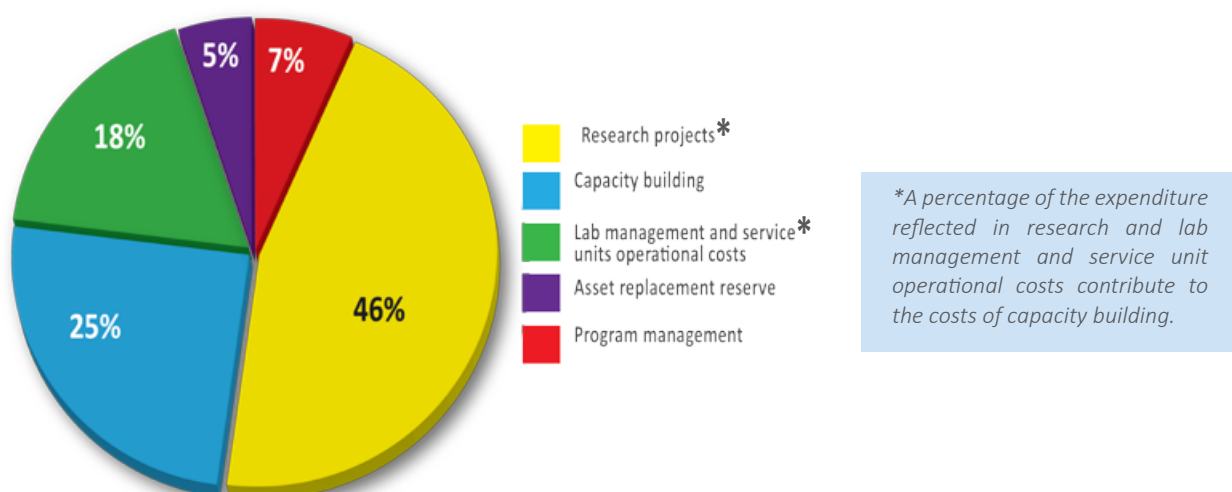


## Statement of income and expense

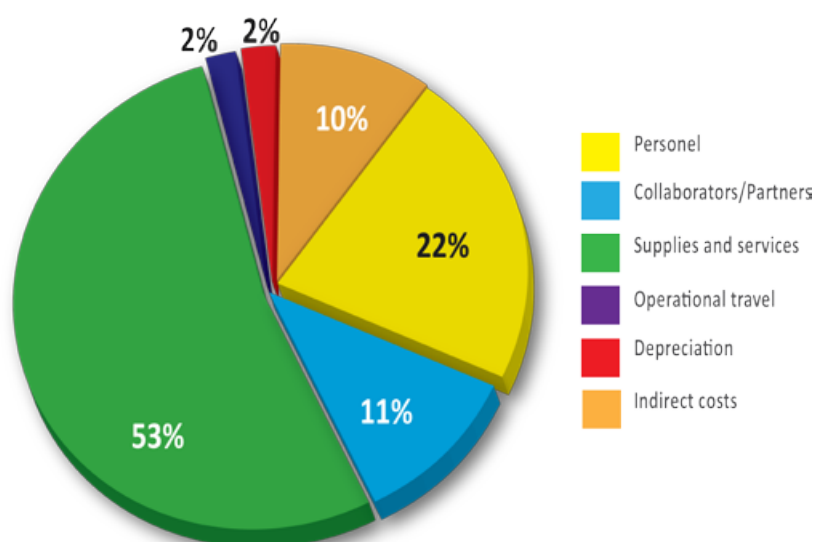
### Funding analysis for the period of 1 January to 31 December 2014



### Expenditure by activities for the period 1 January to 31 December 2014



### Expenditure by natural classification for the period 1 January to 31 December 2014









# Increasing the use of modern bioscience for agricultural research in Africa for Africa

Biosciences eastern and central Africa-International Livestock Research Institute (BecA-ILRI) Hub was established in Nairobi, Kenya, with the aim of increasing the use of cutting edge bioscience technologies to address Africa's agricultural, health, and environmental challenges. The BecA-ILRI-Hub enables research, capacity building and product incubation, conducted by scientists in Africa and for Africa, and empowers African institutions to harness innovations for regional impact. There are 18 countries in the BecA region- Burundi, Cameroon, Central Africa Republic, Congo Brazzaville, Democratic Republic of Congo, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Kenya, Madagascar, Rwanda, São Tomé and Príncipe, Somalia, South Sudan, Sudan, Tanzania and Uganda.



biosciences  
eastern and central africa



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