

February 26, 2010

**Dear Friends,**

With your continued support, 2009 was an exciting year of completion of new facilities, continued research and capacity building and expanded possibilities. The Biosciences eastern and central Africa-International Livestock Research Institute (BecA-ILRI) Hub has now supported implementation of research projects and laboratory-based training involving 24 African and a number of non-African countries. Students continued publishing their work, graduating and moving on to higher positions including back home in their national programs. We enhanced our facilities and scientific competencies to better support the region's growing agricultural research needs in the years ahead. Our increased capacity has been met by tremendous demand from the region and beyond for well-supported, world-class facilities. Researchers from across the continent and around the world are now addressing Africa's most significant agricultural constraints in our laboratories.

BecA is an initiative developed within the framework of the New Partnership for Africa's Development (NEPAD)/African Union African Biosciences Initiative. Located at and managed by ILRI in Nairobi, Kenya, the BecA-ILRI Hub (hereafter referred to as the Hub) provides a common biosciences research platform, research-related services and capacity building opportunities to the region and beyond. The Hub aims to increase access to affordable, world-class research facilities and to create and strengthen human resources in biosciences and related disciplines in Africa. These activities focus on addressing key constraints in African agriculture.

The Hub owes its existence to the significant financial contribution from the Canadian International Development Agency (CIDA), the support of NEPAD and the work and commitment of many other proponents. CIDA supported renovation of existing laboratories and construction of new facilities at the Hub, helping us better accommodate the needs of the region. The Syngenta Foundation for Sustainable Agriculture (SFSA), a long-time supporter, is now providing substantial financial and technical support critical to the sustainability of the Hub. We are also grateful for support from the core donors of ILRI, the Bill & Melinda Gates Foundation (BMGF), Roche, the Google Foundation, the Government of Kenya and many others who have supported our partners and students. With the help of our many partners and investors, the Hub has become a focal point for the African agricultural research community and their global partners.

**BecA-ILRI Hub**

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## Facilities Upgrade

With support from CIDA, the Hub facilities upgrade and construction is now essentially complete. The expansion and refurbishment of laboratory and related research and capacity building facilities of the Hub have progressed steadily throughout the ILRI campus with three major components: buildings, infrastructure and equipment. New construction and refurbishment includes Biosafety Level (BSL) 1–3 science laboratories; a greenhouse complex; new office space for more than 150 people; and a number of support buildings. The existing laboratory and related support facility space has been almost doubled with construction of new spaces; over 10,000 m<sup>2</sup> of research and support spaces is now available. Approximately 90% of these spaces are now in use. A few of the more sophisticated laboratories are being certified according to international standards in the coming weeks.

With the opening of the new and refurbished laboratories, our scientific capacities have expanded significantly. Construction of a BSL-3 containment laboratory, one of a handful in Africa, is essentially complete. It will be used for research on animal pathogens constraining livestock health in Africa. In order to serve the region's full agricultural improvement needs, we now have state-of-the-art crop research laboratories as well. These include a non-containment tissue culture laboratory, BSL-2 plant transformation laboratories and a greenhouse complex including three BSL-2 greenhouse compartments. An entire wing of the Hub is now dedicated to laboratory-based training activities.



Our facilities are complemented by cutting edge equipment to increase the speed and efficiency of African agricultural improvement. Funding from CIDA (US\$2.7 million) was used in the procurement of a wide range of laboratory equipment. Roche has contributed a next-generation 454 pyrosequencer, capable of decoding one billion units of genetic code per day. The 454 machine is being used in a Google Foundation-supported project, led by *icipe* - African Insect Science for Food and Health in collaboration with ILRI and other key partner organizations in Kenya. The project focuses on the distribution and variation of Rift Valley Fever virus, which causes a serious disease of cattle and other domestic ruminants; novel viruses carried by arthropods; and the interaction between these pathogens and their hosts. A new BMGF-funded project led by the International Institute of Tropical Agriculture (IITA) in collaboration with Tanzania's Agricultural Research Institute and Uganda's National Agricultural Research Organization (NARO) and hosted at the Hub will use 454 sequencing to enhance our understanding of cassava resistance to cassava brown streak disease, one of the biggest threats to food security in Africa today. The machine will also be used for molecular marker development, sequencing of genomes relevant

to African agriculture and discovery of pathogens and beneficial microorganisms through metagenomics.

## Capacity Building

In order to address the lack of sufficient expertise in science and technology in Africa, a strong program in capacity building and training is central to the success of our biosciences initiative. This program is increasing the capacity of institutions and individual scientists to conduct biosciences-related research in Africa and to develop and deliver new technologies. In line with the research agenda, our capacity building and training activities will continue to evolve in response to progress achieved and new challenges identified. We gratefully acknowledge the major contributions from our Hub-affiliated scientists and partner institutions, particularly the International Maize and Wheat Improvement Center (CIMMYT); IITA; the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT); the International Potato Centre (CIP); the ILRI-Biotechnology Theme; Cornell University, USA; Washington State University, USA; Kenyatta University, Kenya; Makerere University, Uganda; Swedish University of Agricultural Sciences, Sweden; Uppsala University, Sweden; the Linnaeus Centre for Bioinformatics, Sweden; and several others.

In 2009, 52 African students conducted their graduate research in the Hub laboratories. These include 24 women, such as Salma Hassan from Sudan who is studying sheep theileriosis, a major constraint for smallholder farmers back in Sudan. At the end of 2009, she conducted part of her research back at her institution in Sudan, effectively transferring knowledge acquired at the Hub. Since 2007, 16 MSc and six PhD students have now graduated as a result of research conducted at the Hub. Twelve other graduate students have completed the research component of their project and are awaiting their thesis/dissertation defense for graduation.



We give particular attention to empowering African women in agricultural sciences. One of our important partners is the African Women in Agricultural Research and Development ([AWARD](#)) initiative of the CGIAR Gender & Diversity Program, which has selected the Hub as one of its placement centers.

Laboratory-based activities also included shorter-term training of 10 visiting scientists in small groups or as individuals. For example, two scientists working in a new molecular laboratory at the Rwanda Agricultural Research Institute (ISAR) received training in genotyping and PCR virus diagnostics.

The Hub, in collaboration with our affiliated scientists and other partners, was involved in the organization and implementation of 16 training courses, workshops

and conferences in 2009. These included 550 participants from across Africa and around the world. This represents a nearly four-fold increase in participants compared to those included in the six events in 2008. Examples include:

- 1) “From Technology to Product Development for the African Farmer” was sponsored by SFSA and organized by the Hub. This conference convened stakeholders from along the value chain to discuss translation of research to benefit the smallholder farmer, focusing on sorghum as a case study.
- 2) “US-Africa Connections” was a workshop co-organized with BMGF. This match-making exercise assembled top African and US scientists with common agricultural improvement interests. It was timed to coincide with the opening of Basic Research to Enable Agricultural Development (BREAD), a new program jointly funded by BMGF and the US National Science Foundation (NSF).
- 3) “East/Horn of Africa Community of Practice and Crop Breeders Workshop,” sponsored and organized by the McKnight Foundation’s Collaborative Crop Research Program (CCRP), was the first meeting for this program cluster. Stakeholders from along the value chain, including the Hub, discussed lessons learned from these CCRP-supported projects.

The training courses held in 2009 included 250 participants. Topics included molecular marker-assisted breeding, bioinformatics, biosafety, data analysis, sequencing technologies, technical paper writing and graduate student presentation skills. The Hub is harnessing modern communication technologies to help us meet the growing demand for training in the fields of biosciences. One of the bioinformatics courses, funded by the Swedish International Development Agency (SIDA), successfully used videoconferencing to include participants in Sudan. Several countries in East Africa will soon benefit from much faster internet connections, enabling us to provide more online training workshops in future –reaching more trainees, cost effectively.



Our seminar series brought cutting-edge science from around the globe to the agricultural improvement research community in Nairobi. Fifty seminars were delivered by scientists and postgraduate students. The speakers included prominent scientists and graduate students from institutions in the USA, Europe and Africa.

We are working to expand capacity and support scientists *in situ* across the region. Hub-based laboratory training is followed up to ensure effective technology transfer back to the scientists’ home institutions. To further expand the overall network beyond the Hub, node laboratories (University of Buea, Cameroon; Ethiopian Institute of Agricultural Research, Ethiopia; Sokoine University of Agriculture; Tanzania;

NARO, Uganda; and Kigali Institute of Science and Technology, Rwanda) will be used as originally intended.

## Research

The Hub and its partners conduct a number of research projects in crop, livestock and microbial biosciences. In its three years of implementation, the Hub has successfully mobilized scientific resources to address critical food and agricultural production problems in Africa. These problems include pests and diseases attacking subsistence crops; diseases affecting livestock production and human health, such as zoonotic diseases; and climate change effects, like drought, that limit crop production and pose a threat to future food security in Africa.

Hub and affiliated centers' scientists and students conducted 29 crop-related and 20 livestock-related projects in 2009. The crops studied include beans, cassava, cowpea, enset, maize, millet, napier grass, ocimum, onion, passion fruit, pigeon pea, rice, sorghum, potato, tef, and yam. Research projects on livestock and wildlife include buffalo, chicken, cow, goat, sheep, mice and wildlife. Projects have tackled plant and animal disease agents, including viruses, pests, parasitic weeds (e.g. *Striga*) and animal parasites. Hub-based scientists are actively expanding their research programs to include more projects and train more students.

Leading scientists, mainly from CIP and IITA, will be working with various partners in the new plant transformation facilities to address intractable constraints affecting Africa's poorest farmers.

Scientists from various African National Agricultural Research Systems (NARS) used the Hub to help integrate modern biotechnology into their agricultural improvement efforts. For example, Catherine Gwandu conducted genotyping of sweet potato as part of breeding efforts led by Dr. Fred Tairo (Mikocheni Agricultural Research Institute, Tanzania). Teddy Amuge conducted genotyping of cassava as part of her project with Dr. Elizabeth Kizito at NARO in Uganda. These projects are also using the Hub's full service genotyping provision program.



## Research Services

As illustrated by the examples above, a number of scientists from across Africa are supported by our sequencing and genotyping services. Our SEGOLIP Unit offers

sequencing, genotyping and oligonucleotide procurement services to Hub users and institutes in the region and beyond. We recently added full service genotyping, including DNA extraction, to support the needs of NARS scientists. SEGOLIP is also expanding its services to include next generation sequencing, for which two technicians received training from Roche in Germany.

Annual demand for SEGOLIP services has increased steadily each year to over 600% since its inception. The unit provides services to scientists in a growing number of countries. This is driven in part by the steadily increasing number of scientists from African NARS who have received training at the Hub and integrated molecular markers into their breeding programs.

### **Enhancing human capacity at the Hub**

The Hub team expanded to 33 core scientific and technical staff in 2009, adding several key members. Among our new recruitments is Dr. Appolinaire Djikeng, a native of Cameroon and previously an Assistant Professor at the J. Craig Venter Institute, USA. He joined the Hub as Technology Manager in September, 2009, with a proven track record in technology transfer to developing countries. Appolinaire adds expertise in genomics, metagenomics, RNA interference, gene discovery and the application of next generation sequencing methods for ultra high throughput genome sequencing. A Linux/Unix Specialist has further strengthened our bioinformatics capacity building, research and services unit. We also hired a supervisor for the new greenhouse complex, an additional senior technician for the SEGOLIP unit, a Program Management Officer and a Capacity Building and Project Assistant.

The 63 affiliated scientists and their technical staff, mainly from the ILRI-Biotechnology Theme, CIMMYT, CIP, ICRISAT and IITA, are an indispensable part of our research and capacity building activities.

A number of visiting scientists further bolstered our ability to support research projects in 2009. They came from African countries including Madagascar, Kenya and Ethiopia. Additionally, Dr. Rebecca Nelson, Associate Professor in Cornell University's Department of Plant Pathology and Plant-Microbe Biology, spent her sabbatical at the Hub. Rebecca helped in Hub strategy development and initiated research on aflatoxin contamination of maize.

### **Visitors**

We were privileged to receive over one thousand visitors in 2009. They included scientists, policy makers, donors, private sector leaders and students. Mr. Bill Gates toured our laboratories in December, discussing ongoing research activities with scientists and students currently working at the Hub. Honorable Bob McMullen, the Australian Parliamentary Secretary for International Development Assistance, spoke with our researchers and delivered a rousing lecture on international development. Other visitors included: Professor Gebisa Ejeta, 2009 World Food Prize winner; Mr. Michael Mack, Chief Executive Officer of Syngenta; the ILRI board of trustees; Ms.

Sylvia Mathews, President of the BMGF Global Development Program; Dr. Joe DeVries of the Alliance for a Green Revolution in Africa; various country delegations including those from Australia; the BecANET steering committee; officials from CIDA; Dr. Ahmed El-Sawalhy, Director of African Union/Inter-African Bureau for Animal Resources; participants of US-Africa Connections and all other workshops conducted at the Hub; and science journalists from around the region. We are eager to share our work with visitors, many of whom have been inspired to become our unofficial ambassadors, spreading word of our successes and aspirations.



## **Communications**

A number of articles and websites featured Hub projects and scientists last year. We were deeply honored to be highlighted in Mr. Bill Gates' [annual letter](#), which synthesizes his experiences into his vision of development for the future. Visits by various journalists have generated a wave of positive news articles, published in widely read and respected newspapers. Coverage included an [article](#) featuring Hub and affiliated scientists in Science Magazine. Several documentary pieces focused on research based at the Hub were aired in 2009. The Born Free Foundation produced an international award-winning film focused on the illegal bush meat trade. It featured a molecular diagnostic assay, developed and validated by researchers at the Hub and the University of Nairobi, which can identify illegal bushmeat in commercial markets. Dev.tv, based in Switzerland, released a film on the Hub focused on a livestock disease research project. The Consultative Group for International Agricultural Research (CGIAR) also filmed their [Voices for Change video](#) at the Hub laboratory facilities, featuring our students and scientists. Links to other Hub-related communications can be found on our [website](#).

With funding from BMGF, we are constructing a searchable online database of scientists from around the world who are interested in African agricultural improvement. Please contact us if you would like to be included!

## **The impending revolution**

The support of scientists and partners from around the world is absolutely critical to our past and future success. Now that we have expanded our capacity to host far more scientists and students in our laboratories, reliance on our global network is even more important. We hope you will continue to lend us your support and spread the word about the Hub.

Faced with a future of harsher environmental conditions and more mouths to feed, together we can empower Africa to be self-reliant and a breadbasket for the world. We are all stakeholders in Africa's livelihood.

Sincerely,

A handwritten signature in purple ink that reads "Segenet Kelemu". The signature is fluid and cursive, with the first name "Segenet" and the last name "Kelemu" clearly distinguishable.

Segenet Kelemu  
Director  
BecA-ILRI Hub

*For additional information, please visit our [website](#).*