BecA-ILRI Hub in

Ethiopia

Over **USD 800,000** Funding allocated to research and capacity building in 4 years

Over **50** Scientists benefited from training workshops

24 Research scholarships through Africa Biosciences Challenge Fund since 2011

Over **10** Partner institutions

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. 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.

The BecA-ILRI Hub in Ethiopia

In empowering African researchers and institutions to exploit biosciences opportunities, the BecA-ILRI Hub contributes to addressing key agricultural constraints in food production, nutrition and animal health in eastern and central African countries, including Ethiopia. This is achieved through partnerships with the country's national agricultural research system (NARS), development organizations and other stakeholders. Since 2010, the BecA-ILRI Hub has contributed to NARS in Ethiopia through various engagements including:

Collaborative research

The projects, which include national partner-led research projects, are demand driven, responding to the high priority themes identified for increasing the productivity of food and improved agricultural systems in Ethiopia.

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.

In Ethiopia, the project has involved local communities in establishing a genetic improvement program. Starting with combined flock of 4000 does belonging to farmers in the study sites in Ethiopia, the project has selected from among their offspring 100 bucks on the basis of performance for use as breeding stock. The progeny of these bucks will be similarly evaluated and the best among them used for subsequent generations until the breeding objectives are attained. The well characterized resource population creates an opportunity to apply genomic selection tools to accelerate genetic gains.

The project supports human capital development through the involvement of students and NARS researchers in the studies.

Enhancing food security through tissue culture and diagnostics

Tissue culture is among the most widely used biotechnologies in African agricultural improvement. When applied correctly, it enables

The goat research project team holds group discussions with farmers in Belaku in the Amhara region of Ethiopia

the large scale production of disease-free, high performing, farmer-preferred varieties.

A large population in south and southwest Ethiopia depends on the root crop taro for their daily food. Taro is a tropical plant grown primarily for its edible starchy corms. Being vegetatively propagated, taro is prone to viral infection and as a result, its production has declined significantly.

Research has been carried out at the BecA-ILRI Hub by Dawit Beyene, a researcher, Ethiopian Institute of Agricultural Research (EIAR) to determine the identity and incidence of viruses associated with taro in Ethiopia. The results of the study show that there is a high infestation of taro plantations by Dasheen mosaic virus (DsMV) and possibly two new viruses. A bigger project to address the problem of taro viruses in Ethiopia was developed from these initial findings and formed part of Beyene's PhD studies funded by an Australian Awards for Africa scholarship which are being co-supervised by a BecA-ILRI Hub scientist and carried out partly at Queensland University of Science and Technology, Australia and at the BecA-ILRI Hub.

Strategic partnerships

By engaging key researchers and strategic agricultural research institutions in Ethiopia, the BecA-ILRI Hub is playing a key role in driving change in the country's agricultural research system. Technical and advisory support on technologies, best practices and cost effective management of facilities as well as institution specific interventions have resulted in enhanced agricultural biosciences capability.

Strengthening institutional capacity at Holetta Agricultural Research Centre, Ethiopia

In 2013, the BecA-ILRI Hub conducted its annual *"Introduction to Principles in Laboratory Management and Equipment Operations Workshop"* at the Holetta Agricultural Research Centre in Ethiopia. While participants were drawn from various research institutions across eastern and central Africa, the Holetta Agricultural Research Centre was able to leverage on the hands-on approach to install equipment that had been received through a World Bank grant, and operationalize parts of the biotechnology laboratory that were not yet in use.

The course was designed to address the operational gaps that exist in managing research facilities in Africa and introduced participants to principles in biosciences laboratory management and equipment operations including compliance with legal and regulatory frameworks for health and safety, waste management, import and export of biological materials and biosafety.

The BecA-ILRI Hub continues to seek other strategic interventions that contribute to the support and strengthening of capacity of Ethiopian NARS to deliver on their mandate.

Partner institutions

- Ethiopian Institute of Agricultural Research (EIAR)
- Holetta Agricultural Research Centre, EIAR
- Addis Ababa University (AAU)
- Hawassa University College of Agriculture (HUCA)
- Haramaya University
- 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

Capacity building

The BecA-ILRI Hub is expanding the base of expertise in agricultural research in Ethiopia by hosting scientists and graduate students to conduct research, and by conducting training programs. Research placements combine training in the latest technologies, as well as giving researchers the opportunity to conduct research on topics addressing food and nutritional insecurity and livestock health.

Dawit Beyene (r) a researcher from Ethiopian Institute of Agricultural Research (EIAR) and PhD student at Queensland University of Science and Technology, Australia conducting collaborative research on taro with researchers from Burundi at the BecA-ILRI Hub (photo: Beca-ILRI Hub\Valerian Aloo).

There are four main categories of capacity building and training activities that have involved several scientists and graduate students from Ethiopia:

Post graduate students

Post graduate students (MSc and PhD candidates) have conducted research at the BecA-ILRI Hub either by being attached to existing Hub hosted-research projects or through stand-alone thesis projects.

Small group training and short-term visiting scientists

Smaller groups of up to five participants have also received tailor-made training and laboratory work programs. Visiting scientists from Ethiopian universities or other research institutes have come to the BecA-ILRI Hub to use the facilities or equipment to advance their research projects.

Training workshops

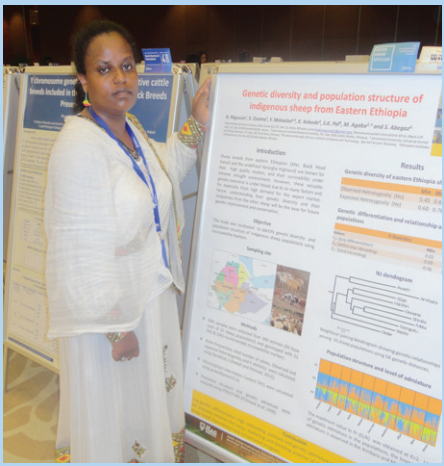
Since 2009, over 50 Ethiopian scientists have benefited from group training workshops which emphasize problem-solving, hands-on training, seminars, discussions and laboratory practical work. These trainings are developed within the BecA-ILRI Hub's core competencies such as genomics, bioinformatics, diagnostics, molecular marker development and applications, DNA sequencing and genotyping, and scientific paper writing.

Africa Biosciences Challenge Fund (ABCF)

This is a competitive fund which facilitates access to the BecA-ILRI Hub for scientists and students from African National Research Institutes and universities.

Through this program, Ethiopian scientists have received support for their research fellowships, pilot project grants and training.

Building science leadership of national researchers



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 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.

Getinet Mekuriaw, an ABCF research fellow at the BecA-ILRI Hub presented a paper based on his resesearch partly carried out at the BecA-ILRI Hub during the Sixth All African Conference on Animal Agriculture in Nairobi on 27 October 2014.

Mekuriaw's presentation titled '*A review of genetic diversity of domestic goats identified by microsatellite loci from global perspective*' was based on a paper authored together with five other scientists from the Addis Ababa University in Ethiopia, the BecA-ILRI Hub and ILRI. The paper was an evaluation of the research that has been done so far in establishing the genetic diversity of domestic goats globally.

Nigussie and Mekuriaw are only two examples from a pool of Ethiopian national researchers whose capacity to conduct and present their research has been greatly enhanced through placement and interactions at the BecA-ILRI Hub.

The following Ethiopian scientists have benefited from the Africa Biosciences Challenge Fund fellowship program

Selamawit Getachew Bedane
Haramaya University
26 July-28 October 2011
Project title: Reminder-transferability of banana microsatellite markers for assessing genetic diversity of enset (*Ensete ventricosum* (Welw.)) in Ethiopia

Sisay Kidane Alemu
Ethiopian Institute of Agricultural Research
26 July-28 October 2011
Project title: Reminder-transferability of banana microsatellite markers for assessing genetic diversity of enset (*Ensete ventricosum* (Welw.)) in Ethiopia

Dawit Beyene
Ethiopian Institute of Agricultural Research
16 July–31 December 2012
Project title: Occurrence and distribution of taro (*Colocasia esculenta* L.) viral diseases in Ethiopia
18 May 2015–18 February 2016
Project title: Metagenomics analysis of taro viruses in East Africa

Zelalem Gebreegziabher
Somali Region Pastoral and Agro-Pastoral Research Institute
9 August - 31 December 2012
Project title: Molecular diversity of haricot bean (*Phaseolus vulgaris* L.) germplasms from Ethiopia

Yemisirach Mulugeta
Addis Ababa University
23 August 2013–21 February 2014
Project title: Molecular charactyerization of bacterial and fungal isolates from *Ensete ventricosum*

Adey Feleke
Addis Ababa University in Ethiopia
20 February–31 May 2012
Project title: Microbial diversity in an experimental tannery wastewater treatment plant in Ethiopia

Asmare Dagnew Moges
Ethiopian Institute of Agricultural Research (EIAR)
1 September 2014–31 July 2015
Project title: Development of microsatellite markers for the genetic analysis of *Psuedocercospora angolensis* from Ethiopia

Daget Ayana Tegegne
Addis Ababa Science and Technology University
12 June 2013–31 January 2014
Project title: Metagenomic microbial exploration of thermal vents and hot springs of the Ethiopian rift valley

Getinet Mekuriaw Tarekegn
Bahir Dar University, Ethiopia
15 June 2014–6 April 2015
Project title: 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
1 July 2014–28 February 2015
Project title: Bacterial and fungal endophytes of Brachiaria species from Ethiopia

Abel Debebe Mitiku
Ethiopian Institute of Agricultural Research
31 July 2014–30 June 2015
Project title: In vitro protocol optimization for virus elimination and multiplication of Garlic *(Allium sativum L.)* 'Bishoftu nich'

Tadesse Eguale
Aklilu Lemma Institute of Pathobiology
10 October 2014–10 June 2015
Project title: Molecular characterization of drug resistance determinants of Salmonella isolates from humans and animals in Central Ethiopia

Zurfan Sisay Worku
Addis Ababa University
2 December 2013–31 May 2014
Project title: Molecular epidemiology of enteric viruses in Ethiopia

Adane Abraham
Ethiopian Institute of Agricultural Research Holetta Agricultural Research Center
5 June 2013 - 26 August 2013
Project title: Characterization of garlic viruses in Ethiopia with RT-PCR and Illumina MiSeq technology for developing diagnostic tools

Helen Nigussie
Haramaya University
5 June 2013–4 December 2013
Project title: Phenotypic and genetic characterization of indigenous sheep breeds eastern Ethiopia

Anberber Manyazewal
Addis Ababa University
23 September 2014–22 December 2014; 17 February 2015–16 November 2015
Project title: Molecular epidemiology of cryptosporidium infections in humans and cattle in Addis Ababa and its environs

Melkamu Ayalew
Haramaya University
15 January 2013–30 June 2013
Project title: Fumonisin and aflatoxin producing fungi on maize (*Zea mays* L.) grain and evaluation of maize genotypes for their management in Ethiopia

Ertiro Berhanu Tadesse
Ethiopian Institute of Agricultural Research
15 July 2013–15 October 2013
Project title: Molecular characterization of maize germplasm widely used by the Ethiopian Institute of Agricultural Research

Alemu Abate Asfaw
Aksum University Ethiopia
2 July 2015–3 March 2016
Project title: Morphological, Nutritional and Molecular Diversity of Ethiopian Grass pea (*Lathyrus sativus* L.) Accessions

Asfaw Kifle Wadollo
Southern Agricultural Research Institute
1 July 2015–31 December 2015
Project title: Investigation of genetic and agro-ecological variability in Ethiopian taro (*Colocasia esculenta* L. Schott) accessions to ensure food security and alleviation of poverty: implication on conservation and breeding

Tiruneh Ashenafi
University of Gonda
1 July 2015–31 December 2015
Project title: Genetic diversity of Avena species using agro-morphological, cytological and molecular markers from Ethiopia

Atnaf Mulugeta
Ethiopian Institute of Agricultural Research
1 July 2015–31 December 2015
Projet title: Genotyping neglected multipurpose Ethiopian indigenous white lupin accessions to harness its genetic diversity

Asheber Tegegn
Ethiopian Institute of Agricultural Research
20 August 2015–19 February 2016
Project title: Molecular characterization and genetic diversity of Ethiopian Brachiaria ecotypes using simple sequence repeat (SSR) marker technique

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