Bio-Innovate in Ethiopia

Creating effective partnerships along bio-innovation value chain

$1,790,996

Birr 35,296,053

Total funding allocated to Ethiopian partners for a period of 4 years

- **5** Innovations delivered
- **10** PhD and MSc Students trained
- **2** Consortia projects led by Ethiopian institutions
- **6** Projects in which Ethiopian institutions are partners

Bio-Innovate in Ethiopia

Bio-Innovate Program supports multi-disciplinary biosciences and product-oriented innovation activities in the eastern Africa countries of Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda.

At 91 million people, Ethiopia is the world most populous landlocked and third most populous country in the continent. The country is blessed abundantly with arable land, estimated at about 66% of the 111.5 million hectares total area. However, only 22% is said to be under cultivation. Most food crops as well as coffee, are produced by smallholder farmers. The agricultural sector accounts for 90% of the total foreign exchange earnings estimated at $3Billion annually with coffee contributing about 63% of total value or 70% of the total value of agricultural exports and roughly 2% of the world coffee market. Ethiopia also exports horticultural products, oil seeds and livestock. The country has an immense livestock resource, which is believed to be one of the highest in Africa.

BioInnovate Partners in Ethiopia

Research and Public Sector Institutions

1. Addis Ababa University
2. Hawassa University
3. Ethiopian Institute of Agricultural Research
4. Ministry of Science and Technology, Ethiopia
5. Biosciences for Eastern and Central Africa
6. International Potato Center Sub-Saharan Africa
7. International Crops Research Institute for the Semi-Aid tropics

Private Sector Partners

1. Coffee Plantations Development Enterprise
2. Leather Industry Development Institute,
3. Tannery and Bekas Chemicals Plc.
4. Addilo Complementary Foods Process Unit
5. Modjo Tannery Sc. Co.

Innovation Products and Technologies developed

1. Drought and disease resistant sorghum, finger millet, sweet potato and canning bean varieties developed and currently under validation in the national performance trials.
2. Industrial waste management technology that combines mushroom, bio-energy and bio-fertilizer production from coffee waste pilot tested.
3. Integrated industrial waste treatment technology that combines bio-digestion and artificial wetlands for converting tannery wastewater to bio-energy, bio-fertilizers and recyclable water pilot-tested.
4. Prototypes for complimentary flour from sorghum and legumes and sorghum-based extruded snack foods developed.
5. Policy and regulatory recommendations that will support the uptake of bio-pesticides and industrial effluent management technologies in the region developed.

Improving Food and Nutrition Security, Climate Change Adaptability, Productivity

Sorghum and finger millet innovations

Sorghum and finger millet has been essential staple foods in the semi-arid tropics of Africa for centuries. Nutritionally these grains are a good source of protein and other minerals. However, productivity remains below their genetic potential due to low research investment that can address these challenges. Overall the project is looking into technologies that can minimize climate change effects, raise productivity and increase income.

Achievements
Superior lines for sorghum and finger millet that are drought tolerant and early maturing are being evaluated in the National performance trials as a prerequisite for commercialization of the varieties.

Partnerships
- Addis Ababa University
- Ethiopian Institute of Agricultural Research

Cassava potato and sweet potato agricultural innovations

Cassava, potato and sweet potato are three important cash and food crops that can provide food security and adaptation to climate change in the sub-Saharan sector. Productivity is a challenge as there lacks an efficient seed delivery system for clean planting material for smallholder farmers that are drought and disease resistant and adaptable to specific agro-ecological zones.

Achievements
Drought and disease resistant varieties for sweet potato developed.

Partnerships
Addis Ababa University

Beans agricultural innovations

The canning industry in the region has had one canning variety, the Mexican 142 to work with for 60 years. This variety has succumbed to diseases like rust, angular leafspot, bacterial blight and susceptible to drought conditions over time. In addition, there is no organized production of certified seed for the bean famers servicing the canning industry. The local Ethiopian bean export industry suffers from famers delivering poor quality beans. The industry and farmers need bean varieties adoptable to drought and disease pressure, and also meet the stringent industrial processing requirements.

Achievements
Canning bean lines that are not only agronomically superior exhibiting higher yields but also industrially acceptable for processing have been developed and submitted to the national performance trials for validation as a prerequisite to commercialization of the new varieties.

Partnerships
- Acos Ethiopia Plc
- Ethiopian Institute of Agricultural Research

Waste Treatment, Production of Bio-energy from Renewable Bio-resources and Securing Fresh Water Resources

Integrated waste treatment and value addition innovations for coffee and sisal processing waste project

As African countries strive to shift from primary agrarian economies to industrial based bio-economies with emphasis on value addition, sustainable handling of industrial waste will be key. Coffee processing is generating 9 million m^3 of wastewater and 600,000 tons of husks annually. This waste is in many cases is disposed off haphazardly contributing to pollution that result in the generation of greenhouse gases. With the right innovations, this waste can also be recycled to produce value added products.
Innovation technologies are therefore necessary to not only manage the disposal of agricultural and agro-process biomass but also add value to produce products like food, feed, bio-fertilizer and bio-energy.

Achievements
An industrial waste treatment system producing mushroom from coffee processing waste has been pilot-tested in partnership between Addis Ababa University and Coffee Plantations Development Enterprise of Ethiopia.

Partnerships
- Addis Ababa University
- Coffee Plantations Development Enterprise Ltd

Integrated wastewater treatment and value addition project

In the eastern African region, it is estimated that only 10% of the existing industries treat their wastewaters to any degree. The majority of the agro-process industries discharge their effluents directly into nearby water bodies and open land without any form of treatment. The discharge of untreated wastewaters is affecting the health of the people living in downstream communities as well as posing a significant threat to the biological resources in the region. Hence there is need to develop adaptable technologies to manage and add value to agro-industrial waste and wastewater. The project has technologies that combined bio-digestion and wetlands technologies to produce bio-energy, bio-fertilizers and recyclable water.

Achievements
A fully operational integrated industrial effluent management system that combines bio-digestion and artificial wetlands for converting tannery waste to bio-energy, bio-fertilizers and recyclable water has been pilot-tested in a partnership between Addis Ababa University and Modjo tannery.

Partnerships
- Addis Ababa University
- Modjo Tannery Sc. Co. Ltd

Innovation incubation and promotion of targeted value chains

Sorghum and finger millet value addition project

Sorghum and finger millet are two traditional crops that are deeply rooted in agricultural and food systems of the people of eastern Africa. These grains are some of the major cereals grown in eastern Africa region. They are nutritionally superior to other mainstream cereals e.g. maize and wheat with substantial amounts of iron, calcium and zinc. In addition, they are resilient and can grow in semi-arid conditions and require relatively low inputs, which partly make farming of these cereals attractive to farmers. The production of these crops is still very low due to a number of reasons among them the lack of market for the grains.

Traditional processing of sorghum and millet to produce various products is one of the sources of household income. Commercialization has however been limited due to poor quality, safety and short shelf life. Applying appropriate bio-enrichment technologies leading to diversification and commercialization of products is envisaged to create a market and demand for these cereals hence benefiting the key players in the sorghum and finger millet value chain particularly the smallholder farmer and consuming public.

Achievements

The partnership between Hawassa and Addilo processing company has developed prototype products including complimentary flour from sorghum and legumes and sorghum-based extruded snack foods that will be commercialized.

Partnerships

- Hawassa University
- Addilo Complementary Foods Process Unit Ltd

Bio-resource innovation policy analysis and sustainability

Biosciences innovation policy project

There has been an awakening with governments realizing that science, technology and innovation (STI) are critical to the transformation of economies, reduction of poverty, and integration of the continent into the global knowledge economy. In the region, advances in biosciences offers the region opportunities to fully exploit the genetic potential and improve crop productivity, present new agro-processing opportunities to diversify smallholder productions, increase demand for local crops, thereby improving rural livelihoods.

However, enabling policy environment and support system is required that promotes bio-innovation and eventual commercialization of these technologies.

Achievements
Policy and regulatory recommendations developed to support the successful uptake of bio-pesticides and industrial effluent management technologies in the region.

Partnerships
Ministry of Science and Technology

Bio-Innovate Mandate

Eastern Africa is well endowed with huge renewable bio-resources that can be harnessed to stimulate economic growth and competitively position the region in the global economy. For the region to integrate these bio-resources into economic growth, the link between research, innovation and end users has to be strengthened.

The region faces the challenge of poor crop productivity and resilience to climate change in small-scale farming systems, lack of sustainable industrial waste management systems as well as sustainable use of resources (water and land), minimal investments in technology incubation and other mechanisms for putting research into use, and absence of enabling policy environment for mobilization, catalysis and nurturing of a strong bio-resource and science-led economic growth agenda.

Bio-Innovate is providing a regional platform through functional academia and private sector partnerships to support the generation and delivery of bio-innovations that will utilize and translate bio-resources into products and services, as well as innovation policy analysis to support the uptake of these technologies.

The Program is supported by the Swedish International Development Cooperation Agency (Sida).

Vision

The Program's vision is to be a model of how to transform bioscience research to innovation and ultimately pass these products to the end user, and in the process ensure that science, technology and innovation actively contributes to socio-economic development and improve livelihoods in the region.

Innovation platforms

Bio-Innovate has adopted a unique approach that involves the creation of functional innovation platforms to deliver products to the end users. To actualize this concept, the Program's consortia projects are designed to include key actors along innovation value chains including scientists, private sector, and other market actors.

The Program is providing an innovation platform that transcends universities, national and international research institutes, regional bioscience initiatives, private sector companies, NGOs and other developmental actors in the eastern Africa region.

Program Management

The Program is hosted at the International Livestock Research Institute (ILRI) in Nairobi, Kenya. The day-to-day management of the Program is conducted by a Program Management Office and supported by a regional technical advisory committee that provides overall Program implementation oversight.

www.bioinnovate-africa.org

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