BioInnovate in Tanzania

Creating effective partnerships along bio-innovation value chain

$2,495,210

Tshs. 4,163,257,885

Total funding allocated to Tanzanian partners for 4 years

- **6** Innovations delivered
- **2** Consortia projects led by Tanzania
- **7** Projects in which Tanzanian institutions are partners
- **2** PhD and MSc Students trained
- **8** Public and private sector partners

Bio-Innovate in Tanzania

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 947,300 square kilometres Tanzania is the world's 31st largest country and the 13th largest in Africa. As of 2012, the country's population was 47.78 million. The country relies on agriculture, which accounts for more than 25% of the country's GDP, provides 85% of exports, and employs 80% of the work force. Tanzania's industrial sector is also experiencing rapid growth and is one of the fastest growing in Africa accounting for 22.6% of the country's GDP.

BioInnovate Partners in Tanzania

Research and Private Sector Organizations

1. Sokoine University of Agriculture
2. University of Dar es Salaam
3. Selian Agricultural Research Institute
4. Tanzania Commission for Science and Technology
5. Biosciences for Eastern and Central Africa
6. International Crops Research Institute for the Semi-Aid tropics
7. International Potato Center Sub-Saharan Africa

Private Sector Partners

1. Alpha Seed Company Limited
2. Banana Investment Ltd
3. Mohammed Enterprises Tanzania Ltd
4. Morogoro Ben's Winery

Innovation Products and Technologies Developed

- Drought and disease resistant sorghum, finger millet, sweet potatoes, canning beans and cassava lines developed.
- Industrial waste management technology that combines mushroom, bio-energy and bio-fertilizer production from post-harvest sisal waste piloted.
- A full-scale integrated industrial wastewater management system producing bio-energy, bio-fertilizer and recyclable water for irrigation from banana wine brewery waste, installed and operational.
- Prototype sorghum-based clear non-alcoholic malt drink has been produced and consumer tested as a prerequisite for commercialization.
- Policy and regulatory recommendations developed to support the successful uptake of bio-pesticides and industrial effluent management technologies in the region.

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 and acid tolerant are being evaluated in the National performance trials as a prerequisite for commercialization of the varieties.

Partnerships
Mikocheni Agricultural Research Institute

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

1. Integrated waste treatment and value addition innovations for coffee and sisal processing waste

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. This waste in many cases is disposed off haphazardly contributing to pollution that result in the generation of greenhouse gases.

With innovative technologies, waste can be recycled to produce value added products. In the case of sisal processing only 2% of the sisal plant goes into producing sisal fibre with the rest considered waste in addition to huge amounts of wastewater generated from the processing. Sisal processing in Kenya and Tanzania is generating 20 million m^3 of sisal decortication wastewater, 5 million tons of solid wastes and 4-8 million tons of post-harvest sisal boles annually.

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

- Industrial waste treatment system that combines production of mushroom, bio-energy and bio-fertilizer from sisal post-harvest waste has been pilot-tested in a partnership between Dar es Salaam University and Mohammed Enterprises Tanzania Ltd.

Local mushroom market research has been conducted with positive results

Partnerships

- University of Dar es Salaam
- Mohammed Enterprises Tanzania Ltd

2. 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

Through a partnership between Nelson Mandela African Institute of Science and Technology and Banana Investment Limited has delivered a full-scale integrated wastewater management system that produces bio-energy, bio-fertilizer and recycled wastewater for irrigation from the wastewater generated by the banana wine making process. The system is fully operational.

Partnerships

- Nelson Mandela African Institute of Science and Technology
- Banana Investment Limited
- AGENDA for Environment and Responsible Development

Innovation incubation and promotion of targeted value chains

1. 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. Sorghum and millet 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 semiarid 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.

However, commercialization has 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

- Through a partnership between Sokoine University and Morogoro winery, prototype sorghum-based clear malt drink has been produced and subjected to consumer testing as a prerequisite for commercialization.
- Manual for improved postharvest handling for sorghum and millet adapted to local conditions produced and pretested

Partnerships

Sokoine University of Agriculture

2. Bio-enhanced seeds and seedling project

There is growing global concern on the impact of pesticides on consumer health, and especially so in the traditional export markets of the European Union (EU), which has placed restrictions on certain chemicals as well as maximum residue levels (MRLs) in marketable produce.

Recently EU, the the destination of horticultural products from the region, introduced stringent quality control measures to check the conformity to MRLs allowed. Farmers in the region are bearing the brunt of strict EU regulations on pesticides, which threaten to cripple the horticulture sector.

An alternative approach would be to utilize bio-pesticides. Microbial biological control using bio-pesticides offer a much-needed alternative to chemical pesticides. However, this technology has not permeated to smallholder farmers in the region who are in dire need of non-chemical based pest and disease management approaches.

Achievements

The project has developed and produced protocols for bio-enhancing maize, tomato and eggplant seeds with bacterial and fungal based bio-control agents and efficacy tests at experimental fields have been conducted and further validated at farmers' fields.

Partnerships

- Alpha Seed Company Limited
- Jomo Kenyatta University of Agriculture and Technology, Kenya
- Real IPM Company Limited, Kenya

Bio-resource innovation policy analysis and sustainability

Biosciences innovation policy project

In the region, 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. 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.

Partnership
Tanzania Commission for 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.

Bio-Innovate Africa
Bio-Resources Innovations Network for Eastern Africa Development

www.bioinnovate-africa.org

ILRI
INTERNATIONAL LIVESTOCK RESEARCH INSTITUTE

SWEDEN

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