NATIONAL AGRICULTURE RESEARCH LABORATORIES (NARL) KAWANDA

Modernization of Agriculture through research and innovation

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BACKGROUND & HISTORICAL BRIEF

In 1934, Borup K, A danish farmer, sold his 630-hectare rubber farm located in Kawanda to the government of Uganda. In 1937, the department of agriculture turned these 630 hectares into the headquarters of its research division with the mandate to conduct research on coffee, tea, cotton and native food crops.

In 1993, the research division was converted into an agency known as the National Agricultural Research Organization with Kawanda as one of its institutes.

Kawanda Agricultural Research Institute as it was known then became the hub for scientific innovations that made agriculture more productive and economically viable.

Since 2005, National Agricultural Research Laboratories (NARL), is one of the sixteen (16) Public Research Institutes under the National Agricultural Research Organization (NARO), an apex body for agricultural research under the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF).

It is located 13km north of Kampala city, along the Kampala-Gulu Highway

NARL'S MANDATE:

Provide research and development services on: Food science and agribusiness; Bio systems and agricultural engineering; Soils, environment and agro meteorology; and Banana, Biodiversity and biotechnology. NARL's research activities contribute to NARO's overall strategic plan of (2018-2028).

What we do:

NARLS's research activities are focused on the following areas:

- Processes, systems and products that enhance market value of agricultural commodities
- Biosystems and agricultural engineering products that improve agricultural production efficiency.
- Tools, recommendations and technologies for improved soil and water management, sustainable land use and resilience to climate change.
- Improved banana varieties and other technologies for enhancing banana productivity and commercialization.
- Technologies and practices that enhance conservation and utilization of plant genetic resources.
- World class infrastructure for research and commercialization in agriculture.

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The Food Bio-sciences and Agribusiness Research Programme



Facilities for food processing



Branded Unpeeled matooke



A Solar Tent Dryer



Maize Crib

The Food Bio-sciences and Agribusiness Research Programme at NARL, together with partners and stakeholders, conducts research that aims to reduce post-losses and waste, extend shelf-life of agricultural commodities, diversify utilitisation, ensure food safety at all stages of the value chain from farm to fork. The Programme also develops innovative products for specific consumer needs and facilitates the transitioning of research generated products/results into commercial products through incubation. The main stay of the products developed is enhanced nutrition and market competitiveness; to extend shelf-life of agricultural produce; ensure safety in agri-food supply chains and process for supporting conversion of research results into commercial products, for incomes and wealth creation.

ACHIEVEMENTS

1. Development and promotion of nutritious value-added products from agricultural produce for increased market access

NARO has built food processing capacity in the areas of food drying, extrusion science, roasting, and food fortification and bakery science. This has helped in promoting products and processes for enhanced nutrition and market competitiveness; to extend shelf-life of agricultural produce; ensure safety in agri-food supply chains and process for supporting conversion of research results into commercial products for incomes and wealth creation. This also places NARO in position to support food processors to develop market acceptable products that substitute instant products currently being imported.

NARO Product development research has also generated products including bamboo puffed snack, bean porridge and Sweet potato porridge thereby unlocking the potential of these under- utilized products which are being commercialized through private food entrepreneurs.

2. Enhancing emergence and growth of agro-enterprises through incubation of proven technologies

NARO has developed a functional agri-business Incubator at NARL that provides agri-business support services to entrepreneurs. This has offered support to over 30 agri-enterprises in terms of Product development, Branding, Mentoring, Partnerships, and Business to Business links.

In addition, NARO has upgraded its food research and testing facilities to support Research and Development as well as product market acceptance.

NARO has also nurtured innovative technologies and graduated them as fully-fledged agri-business enterprises.

In addition, in collaboration with Uganda National Bureau of Standards (UNBS), NARO harmonized the processing lines with the needs for product certification and has had a product produced and certified by the Uganda National Bureau of Standards. Certification of more products is under way. In addition, FBA supports processes that transition research results into profitable agri-business enterprises producing high value products. The enterprises contribute to jobs and wealth creation.

3. Development of processing methods that ensure safety and quality standards for priority commodities

NARO Fish value addition research has optimized a fish smoking kiln which lowers carcinogenic Polyaromatic hydrocarbon (PAH) in traditional fish smoking to acceptable levels thus safer fish products. This Value addition has also raised fisher folk incomes. For instance incomes by Kiyindi women fish processors group increased from 300,000/= in 2010 to more than 100,000,000/ pa in 2017 as a result of improving the way they smoke their fish using the fish smoking kiln. In both local & export markets, the price of small pelagic fish at Wanseko landing site has risen sharply in recent times from UGX 2300/kg to at least UGX 4000/ kg for high quality products (sun dried/smoked) for human consumption.

In addition, a shelf stable, micronutrient rich fish powder from fish skin and bones with proven consumer acceptability has also been developed. The powder is envisaged to reduce Iron deficiency anaemia in children under 5 years (currently pegged at 50%) and women of reproductive age (pegged at 29%).

4. Generation of integrated storage management options for shelf life and storability enhancement of agricultural produce and primary products

To reduce postharvest losses evaluated at 20% in grains (FAO, 2019) and over 45 % for roots and tubers and over 50% in perishables across Sub Saharan Africa, NARO in partnership with private partners, has generated and promoted storage technologies including metal and plastic silos, grain cocoons, maize crib sand and hermetic bags. These have been evaluated and promoted in partnership with development partners and private sector in the districts of Lira, Apac, Masindi, Kibaale, Mbale, Oyam, Gulu and Nakaseke with resultant better quality grain, increased resilience to climate change. As a result, stored grain value rose by 100% after prolonged storage from zero to 6 months resulting in enhanced food and nutrition security and incomes for at least 20,000 households.

Furthermore, NARO has developed the cassava waxing

technology to address Post harvest physiological detoriation. This extends shelf life from 1 day to 28 days after harvest and provides traders adequate time for produce marketing. Two farmer groups in Kyegegwa & Fortportal are producing & selling waxed cassava. In addition research has generated biodegradable packaging from cassava waste and this is available for large scale commercialization.

NARO has developed a Hot water treatment protocol which has been found to result in elimination of fruit fly stages in Tommy atkins mango. This is available for uptake and commercialization by exporters and will result in unblocking this road block to lucrative mango export markets.

5. Development and promotion of Climate Change Adaptation Technologies

NARO has developed and promoted climate-smart adaptation and mitigation technologies in Nakaseke District. Quality control and demonstration centers for Maize and Bean commodities have been established in Bulwadda, Kapeeka and Kyamutakasa. These are also training centres where drying and storage demonstrations are held for the respective areas. As a result, improved food security and agricultural livelihoods of smallholder farmers has been reported in households.

6. Nano packaging of fresh and minimally processed fruits

Through research, Packaging and nutrient dense recipes have been developed and are available for uptake by private sector to enhance agro produce commercialization and national development. These outputs directly contribute to the agricultural sector strategic plans for increased agribusiness and commercialization of Agriculture through value addition.

Conclusion

Although NARL has made big strides in innovation and dissemination of the above products, it is still faced with limited funding. To alleviate this problem, NARL intends to increase avenues for locally generated revenue while leveraging on partnerships with similar research interests as the insitute. The institution is looking to strengthening infrastructural capacity for generating solutions to the challenges of the food industry, transitioning research to commercial products for incomes and wealth creation, and addressing the challenge of lack of food composition tables for Uganda, among other future prospects.

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Pilot Food Processing Plant and a bakery



Extrusion Machinery



Composite Flour made by Equator Commercial



Products from the agribusiness enterprise development

NARO Feed the Future Project.

National Agricultural Research Organization (NARO) under the USAID's Feed the Future (FTF) - NARO Funding Framework is implementing a 5 year research and development initiative with the aim of promoting the use and commercialization of improved technologies with yield and nutritional enhancing characteristics in Uganda.

In order to achieve this, the activity is focusing on the continued improvement of crop genetics, bio-fortification, and integrated pest and disease management for both crops and livestock, in response to social and market needs and other emerging threats. Achieving this objective will directly impact household income and nutritional status, but also improve NARO's institutional capacity to develop technologies suited for various markets.

The approach seeks to shift away from the traditional technology release and lay-back to ensuring released technologies are adopted by value chain agents who need to improve productivity with agri-business orientation that can offer expected returns to the technology/product developers as patent owners in line with the NARO intellectual property (IP) policy. Achieving this objective will directly impact household income and nutritional status, but also guarantee NARO's institutional sustainability in the research marketplace.

In addition, increasing agricultural productivity and enhancing the nutritional value of Uganda's major crops and livestock products is key to contributing to the national and global food security strategy (GFSS) goals of reducing hunger, malnutrition, and poverty as well as increasing the resilience of people and systems.

The areas of focus are explained in two dimensions; geographic and agricultural commodity. Under geographic focus areas, the activity will target all regions of Uganda but a specific implementing partner (IP) will narrow focus in line with target commodities of intervention. Under the commodity areas, several technologies and/or products of eight commodities will be promoted namely; banana, coffee, maize, beans, cassava, potato and sweet potato, livestock, green gram, sorghum, and finger millet.

Research on agricultural technologies and product development with commercialization interest will be implemented by various NARO institutes for suitability in different geographic locations and market segments. Product commercialization and integrated crop and pest management research will be implemented in USAID's Zone of Influence (ZOI) depending on the target value chains.