



# National Agricultural Research Laboratories- NARL

## E-bulletin September 2024

A quarterly E-bulletin highlighting News from NARL and stakeholders: Collaborators, NARO Institutes, Agriculture sector, Donors and the Public and Policy Stakeholders Contacts: P.O.Box 7065, Kampala Tel +256414661977, Email: [director.narl@naro.go.ug](mailto:director.narl@naro.go.ug) website [www.narl.go.ug](http://www.narl.go.ug) tweeter @NarlKawanda, Facebook NarlKawanda

### Message from Director NARL



*Dr. Robooni Tumuhimbise,*

*Director of Research, National Agricultural Research Laboratories (NARL)-Kawanda*

**W**elcome to the new financial year of 2024-2025. Greetings from NARL Kawanda. In this quarterly news E-bulletin, we share news of Research and Development and related events happening at NARL. You will be delighted to know that the Prime Minister of Lesotho's visit to NARO was hosted by NARL, Kawanda. Find out what the Emeritus DG of the National Agricultural Research Organisation (NARO), Dr Ambrose Agona advised Agricultural Research Scientists during NARL's 2024 Scientific Review and Planning Conference.

Also, in this issue, we share with you strides in biological pest control that NARL and partners are advancing with stakeholders to support farmers as an effective Bio-control method that is restoring smiles to farmers in Mukono, Kayunga and other districts in Uganda.

Read about the NARL staff who bid farewell to his program staff as he tookover a new leadership position of Director of Research at NaFORRI.

It is my humble pleasure to remind you that NARL carries out strategic research on five areas of Bananas, Food Biosciences and Agribusiness, Bio systems and Agricultural Engineering, Soils, Environment and Agro- meteorology; Biodiversity and Biotechnology at the main campus in Kawanda, Engineering satellite station in Namalere and the PGRC satellite located at the Botanic Gardens in Entebbe.

To effectively deliver its Research mandate, NARL has research facilities and infrastructure for **soil testing and analysis, Tissue Culture Laboratory, Workshop for Agro-engineering Machinery, Food Processing Centre, Business Incubation Program, Conference Facilities, Agricultural Research Information Service (ARIS), Uganda National Gene Bank (UNGB) and an Insect Museum.**

I wish you nice reading! Your feedback, too is always welcome.



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### NARO hosts Prime Minister of Lesotho at the National Agricultural Research Laboratories (NARL Kawanda)



*Left: Prime Minister of Lesotho Mr. Sam Matekane shakes hands with Dr. John Adriko, current Director of Research, NaFORRI as Dr. Robooni Tumuhimbise (3<sup>rd</sup> right), Director NARL looks on. To the left in a hut is Ambassador of Uganda to South Africa Kintu Nyago. Middle: Dr. Caroline Nankinga (with microphone) explains to Mr. Matekane the dangers of evasive weeds like the Parthenium hysterophorus L (Congress weed) as the current NARO Director General, Dr. Yona Baguma and others look on. Right: The Prime Minister of Lesotho makes a speech to the congregation of KAWANDA in the main Conference Hall.*

The Prime Minister of the Republic of Lesotho Mr. Sam Matekane visited NARL-Kawanda the oldest Institute of NARO-Kawanda. Representing the Hon. Prime Minister of Uganda Hon. Robinah Nabanjja was the Hon. Minister of State for Fisheries in the Ministry of Agriculture Animal Industry and Fisheries Helen Adoa who welcomed the Prime Minister to NARO. “Welcome to the Pearl of Africa, the country with the best weather in the world, the country with the best fruits.” She thanked the Director General (DG) of NARO and management of NARL for transforming NARL Kawanda and expressed gratitude to the visiting Prime Minister for coming to Uganda and hoped that the two countries will exchange visits so that Ugandan Scientists can also learn from Lesotho, respectively.

His Excellency Kintu Nyago, Uganda’s Ambassador to South Africa observed that NARO NARL has always been a home of Research to him and was grateful to the management for keeping the Research vibrant throughout the years. “I used to play football at the football ground, the lorry at Kawanda used to take us to school”, he recollected.” He said that on behalf of the Ministry of Foreign Affairs of the Republic of Uganda, he was grateful to the visiting Prime Minister for championing the close relationship between the two sister countries. He noted that the Ministry of Foreign Affairs in Kampala and High Commission in Pretoria- South Africa will follow up on the political guidance that the two Principles who are the President of the Republic of Uganda and the Prime Minister of Lesotho give to ensure that the two Countries work closely. “The visit to Kawanda Research station mobilizes an emerging close relationship between our two sister countries”, he said.

On his part the Director General of NARO Dr. Yona Baguma thanked the Prime Minister for coming to Uganda and to NARO. “We are so delighted that you set off time to come and visit with us, we thank you for making the decision to come and visit the best research organization on the Continent.



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The DG explained that NARO has been in existence for the last 33 years during which it has focused on four (4) broad sectors that make up the pillars of agriculture which are crops, livestock, fisheries, forestry and mindful of soils, agro machinery and value addition of food. He noted that government has invested in NARO and has enabled it to build one of the best human components of highly talented and world connected staff. "Today NARO is proud to have over one hundred sixty-four (164) PhD holders specialized in different fields". DG further observed that as government has helped to set up infrastructure one of the best in the continent, Government has positioned NARO as one of the best to provide services and products for humanity. Noting that NARO has developed over one thousand (1000) technologies that have contributed to food security, economic security, health security and environmental sustainability.

"As NARO we want to share with you and to invite your country to share many world class platforms that we have. We have one of the best breeding programs across the Continent hosted at this institute, we are the leader of Banana Research in the Continent and perhaps in the whole world". Adding that NARO has one of the best breeding programs on cassava, maize and rice and we it will be a joy to share with Lesotho what has been developed which has benefited not only the people of Uganda but also people in Southern Africa, Northern Africa and other parts of the continent. The platforms are known for excellence including Groundnut research in Eastern Uganda, the Fisheries and Aquaculture Research recognized by African Union among others. "Today we are a leader in a line of volcanology and pharmaceuticals we have been able to make a breakthrough in Anti-tick research perhaps one with the best record ever registered in the world." He observed that NARO is always willing to share what they have with others through training and supervision. He extended invitation to the Private Sector of Lesotho to come and benchmark with NARO.

The Prime Minister of Lesotho was appreciative for the reception accorded to him and his delegation. "Am very happy to be among you and for the welcome we received from His Excellency the President." He observed that they discussed technology transfer between the two countries noting that there is so much to learn from both countries. He promised to bring students from Lesotho to come and learn from Uganda so that they can exchange ideas and invite Ugandan Scientists to Lesotho, "These two countries still have a long way to go to greater heights together by holding each other's hands, he said. "I have learnt a lot since I came here and I promise you that I will return. We might have different temperatures in Lesotho we have winter and summer but with Agricultural Research skills from NARO we will improve the soils and grow foods such as Bananas. He noted that two Ministers from Lesotho will visit Uganda including the Minister of Agriculture who will learn from NARO. Prior to addressing staff of NARO, the host Director of Research at NARL Dr. Robooni Tumuhimbise and other Directors of NARO and staff of NARL welcomed the delegation from Lesotho. The Director gave the background of NARL as the Institute mandated to provide laboratory services and cutting-edge research under five (5) research programs that are the National Banana Research Program, Food Biosciences and Agribusiness, Soils Environment and Agro-metrology, Biodiversity and Biotechnology, Biosystems, and Agricultural Engineering. The Director requested that another program of Outreach be instituted at NARL due to the numerous services of outreach



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the Institute offers. “We extend a lot of Agricultural services to farmers, schools, district local governments, Parliament of this country,” He observed that under the programs NARL has delivered support to the country’s National Development Plan 3 (NDP).” Currently NDP3 is implementing several programs of which NARL feeds in the Agro-industrialization objective of increased Agricultural Production and Productivity and Value Addition and Agro processing”. These perfectly similarly align with the national plans and policies among which are the Vision 2040 of Uganda, Agro-industrialization and the United Nations Sustainable Development Goals (SDGs) respectively. The visiting delegation toured the Biotechnology laboratory, the Food Bioscience and Agribusiness Laboratories and Food processing facility. Later they toured a rich display of exhibition of NARO technologies from the host Institution NARL Kawanda, National Crops Resources Research Institute (NaCRRRI) Wakiso- Namulonge, National Semiarid Resources Research Institute (NaSARRI) Sertere-Igola, National Coffee Research Institute (NACORI) Mukono-Kituza, National Fisheries Resources Research Institute (NaFIRRI) Jinja, National Forestry Resources Research Institute (NaFORRI) Mukono-Kifu, National Livestock Resources Research Institute (NaLIRRI) Wakiso-Nakyesasa. Lesotho is a landlocked country like Uganda and relies on rain fed cereal production and livestock rearing with challenges of the changing climatic conditions.

Since January 2024, NARL has hosted two key Prime Ministers. The Katikkiro of Buganda *Owekitibwa* Charles Peter Mayiga and a delegation from Buganda Kingdom paid a visit in January and the Honourable Prime Minister of Lesotho Sam Matekane along with a delegation from Lesotho visited with NARL in August. The former was strengthening the partnership between NARO and Buganda Kingdom, while the latter visited NARO to acclimatise with the Scientists at the cradle of Agricultural Research in Uganda.



*Left: Minister Helen Adoa representing the Hon. Prime Minister of Uganda hands a gift hamper from NARO to the Prime Minister of Lesotho. Middle: Prime Minister plants a tree at NARL Kawanda compound. Right: Dr Hedwig Nantabirwa welcomes the delegation of the Prime Minister of Lesotho in the company of DG NARO to the Food Bio-Science and Agribusiness (FBA) Program. Hedwig is the Program leader for FBA*



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### NARL Takes Stock of 2023-2024 Research Work



*Left: From left to right Dr. Robooni Tumuhimbise the Director of Research at NAR, Chairman NARL advisory Committee Professor John Muyonga, and a member of NARL advisory Committee, Dr. Ambrose Agona Emeritus DG NARO and Dr. Sadik Kassim DDG in-charge of Agricultural Technology Promotion, pose for a picture outside the Conference hall in Kawanda. Middle: Staff of NARL attending the Review workshop. Right: A female farmer from Nakaseke giving testimony of how improved banana hybrids have improved her livelihood.*

NARL Planning and Review workshop was held from the 25<sup>th</sup> to 26<sup>th</sup> July 2024 at NARL Kawanda Main Conference hall under the theme of “The Contribution of NARL to Uganda’s Socio-economic Transformation”. Implementation of the National Agricultural Research Laboratories’ (NARL) mandate in the period 2023-2024 was examined by various stakeholders.

Under the 5 programs of Food Biosciences and Agribusiness, Biosystems and Agricultural Engineering, Soils, Environment and Agrometeorology, Banana and Biodiversity and Biotechnology, the review workshop subthemes included Advances in Crop Improvement and Conservation, Climate Change and Environment Conservation, Value addition and Market linkages and Engineering Solution for Socio-economic Growth.

Dr. Tumuhimbise Robooni the Director of Research at NARL welcomed participants to the workshop noting that the review was specifically for the financial year 2023-2024. He gave a background of the evolution of NARL from the 1930s to date noting the changes in mandate, name, focus and eventual merger to become one Research Institute with 5 programs.

In his opening remarks, Dr. Sadik Kassim the Deputy Director General of NARO in charge of Agricultural Technology Promotion (ATP), representing the Director General of NARO said that NARL should be a referral Laboratory Institute for NARO offering support to other Institutes’ Laboratory concerns. “NARL is a catalyst that accelerates a function without taking part in it.” He cited key areas of Soils research, genetic and biodiversity conservation, agro-engineering, and Food Biosciences which he observed that are key areas that NARL makes tremendous contribution to socio-economic transformation. He encouraged the Scientists to put more effort in plant physiology and write more and publish the knowledge they gain from research. On the part of extending Research to farmers, he noted that Agronomists need to be concerned about soils, diseases, market access and



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aspects of value addition of the crops promoted. He pointed out that conservation agriculture remains relevant to date although the focus is more on climate smart agriculture.

While giving his keynote speech on the theme of the role of NARL in Contributing to Uganda's Socio-economic Transformation, Dr. Ambrose Agona the Emeritus Director General of NARO observed that Uganda has the potential to feed 200 million people per annum because of the 80 % arable land only 35 % is cultivated. Noting that Agricultural growth in Uganda is gross valued for agriculture, fisheries and forestry at 4.8%; market size is estimated at US\$4.07 billion; GDP at 24.2% (FY 2023/2024). He observed that in Uganda agricultural practitioners face several challenges which include low application of productivity enhancing inputs; declining and degrading land resources. He noted that there is lack of agricultural financing, inadequate pest and disease control worsened by the vagaries of climate change; weak policy, legal and regulatory frameworks which impede Research and Development. He observed that "Transformation of agriculture is anchored on three pillars which are Research and Development, distribution of inputs to the cultivators and extension of the new knowledge."

He recommended the framework for agricultural research to be employed across academia, government and private sector to include innovation of novel agricultural practices that favorably impact people and their environment, involving the identification and creation of novel agricultural technologies to address critical societal needs. Secondly, integration of multiple research areas to solve complex agricultural and environmental problems, which involves development of partnerships and research areas to prioritize crosscutting projects. He further recommended that implementation of novel practices within a wide range of agricultural systems, through outreach education and adaptation to apply novel agricultural research on-farm and embedding Evaluation and systemic analysis throughout the research process through the measurement of new and existing approaches to understudy environmental, health and societal impacts.

On Climate Smart Agriculture, he noted that it is built on existing agricultural knowledge, technologies and sustainability principles that focus on addressing climate change in agri-food system, while systematically considering synergies and tradeoffs that exist between productivity, adaptation, and mitigation. "Climate smart agriculture integrates a range of practices and technologies that are tailored to specific agro-ecological conditions and socio-economic contexts including the adoption of climate-resilient crop varieties, conservation agriculture technologies, agro-forestry, precision farming, water management strategies and improved livestock management."

Noting that a well implemented CSA is expected to produce triple win results of Increased productivity, Enhanced resilience, and Reduced emission of GHG emissions of the food system, avoid deforestation due to cropland expansion, and increase the carbon sequestration of plants and soils. Concerning specific NARL prospects for the future, he challenged NARL to align its value propositions and research streams with in the National budget theme for 2024-2025 which is "Full Monetization of Uganda's Economy through Commercial Agriculture, Industrialization, Expanding and Broadening Services, Digital Transformation and Market Access"



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Noting that on-going projects should be reflective of the budget theme to show harmony and integration.

On the front of Precision Agriculture (PA), Dr. Agona observed that conventional wisdom of agriculture currently demonstrates paradigm shift towards data-driven decision-making and automation; access to mobile-based applications that provide weather forecast, market information, and crop management. Noting that “PA which is the application of precise and correct amount of inputs like water, fertilizers, pesticides at the correct time to the crop for increasing its productivity while maximizing its yields.” He noted that by using data for various facets of farming value chain, PA enables farmers to grow more using less. He urged the NARL fraternity to consider research in areas that leverage technology, observing, measuring, and analyzing temporal and spatial variability, and using the data to improve farming and agricultural practices.

Dr. Agona called upon the NARL team to be in tune with the 4<sup>th</sup> Industrial revolution as the world moves towards advancing Artificial Intelligence (AI), Robotics, the Internet of Things (IoT), Genetic Engineering, Quantum Computing, Nanotechnology, Biotechnology and Advanced Data Analytics .

With emphasis on Nanotechnology that plays an important role in crop production, food processing and packaging, food security and water purification, environmental remediation, crop improvement, and plant protection, Dr. Agona challenged the NARO and MARL team to be involved in Nanomaterial-induced genetically improved animals and plants, site-specific drug and gene delivery of molecules at cellular and molecular levels in animals and plants, and nano-array-based genetic modification in animals plants in the stress conditions used in increasing agricultural productivity.

On the front of value addition, he stressed that Food Biosciences and Agribusiness research agenda on Probiotics, Prebiotics, Nutraceuticals, Supplements, Antioxidants, food ingredients, colour, flavors, preservatives, emulsifiers, Food rheology, texture and structures recommendation to food industry should be of keen interest to the Researchers .He urged them to also consider Food fortification and supplementation but cautioned them on Intellectual Property Rights (IPR) in food innovations and Food investment.

He challenged the Scientists to think wider and provide knowledge on wheat substitution up to 60% to be able to utilize other foods grown widely in Uganda for social-economic transformation. He urged the FBA team to be involved and contribute to Food Policy and Regulation including Food labelling, food standards and Food safety regulations and be the reference laboratory for Food. He urged them to use Block chain Technology (advanced database mechanism) to ensure traceability of products in the agricultural supply chain and better understanding of price transmissions.

Dr. Agona observed that the crop improvement and conservation through Bio-prospecting, terrestrial, subterranean, aquatics and atmosphere gene editing progress, Bio-fortification, Biotechnology, gene banks, in situ and in vitro conservation is still relevant and should be integral in the research work going on at NARL. For the Soils and Agro-metrology, the Emeritus DG noted that Soil mapping, Climate Smart Agriculture, Precision Agriculture, use of Nano-fertilizers, Fertilizers



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from petrochemical industry and crop suitability mapping are very relevant and should be emphasized in the research work ongoing at NARL.

For the engineering solutions, he recommended automated smart irrigation using robotics and drones, developing combine harvesters, using solar power planters, weeders, sprayers, threshers. He recommended further promotion and commercialization of Fish smoking kilns. He recommended that the workshop at EATREAC should be a reference workshop for testing and approval of agricultural machinery by other private sector players as a way of improving machinery quality in Uganda. While observing transformative agricultural research landscapes, Dr. Agona noted that Agricultural transformation is characterized by deep and sustained, nonlinear systemic change, and generally involving cultural, political, technological, economic and environmental processes. "Transformation is warranted for maximizing efficiency, food security, feeding the growing population, ensuring ecological harmony, adapting to changing climate, and promoting human and animal health through mitigation of communicable and non-communicable diseases." He observed that It is imperative that food and agricultural research effectively harness the global convergence of priorities to overcome research silos through deep and sustained systemic change by human health and nutrition, animal health and welfare, food safety and security, and equity and inclusion.

NARL Scientific review workshop amplified the farmer voice through testimonies of how farmers have benefited from research using community seed banks in Nakaseke, cultivating improved banana varieties in Nakaseke and how citrus farming has transformed farmers in Kalaki districts.

An exhibition by incubates from the Food Biosciences and Agribusiness Program showed several value-added products that are available in super markets in many urban areas.

The Deputy Director General in-charge of Research Coordination Dr, Swidiq Mugerwa advised Scientists to be cautious of the market value chains to be ready for markets beyond Uganda. He shared insights from his international travels noting that there are disparities in markets that producers and processors should be aware of "I noticed matooke in the USA are smaller in size and straight compared to the ones in Uganda, which could be a reason they are not easily packaged for some markets". He urged the Researchers to study markets and understand demand, price and other issues that may impede products from reaching those markets.

Read more about the NARL Review workshop through these links

[https://www.newvision.co.ug/category/agriculture/experts-call-for-better-market-insights-in-ag-NV\\_193082](https://www.newvision.co.ug/category/agriculture/experts-call-for-better-market-insights-in-ag-NV_193082)

[https://www.newvision.co.ug/category/agriculture/naro-asks-farmers-to-commercialise-on-larger-NV\\_193041](https://www.newvision.co.ug/category/agriculture/naro-asks-farmers-to-commercialise-on-larger-NV_193041)





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### Training on Biological Control of Papaya Mealy Bug Envisaged to Increase Papaya Production in Uganda



*Left: Dr. Caroline Mary Nankinga on the right joins other stakeholders to hold cut papaya fruits to extract seeds for planting in Nursery beds. Middle: Infected Papaya fruits and leaves. Right: District Agricultural Officers attending the training at NARL Kawanda*

The Director of Research at NARL Kawanda has called upon partners including Private sector, Ministry of Agriculture Animal Industry and Fisheries staff, NARO staff and CABI staff to be cautious about training farmers on Papaya Mealy bug because it can attack over 55 hosts apart from Papaya, so its elimination is vital using biological control. “Chemicals are expensive besides they may not work to eliminate the PMB. We are targeting the PMB specifically and not all insects which chemicals may destroy”. The trainers are the ambassadors who will take the word to other trainers and farmers.

This workshop was a experience sharing moment to exchange experiences of using the biological control parasitism for managing Papaya Mealy bug PMB and use the experiences to design a scaling out biological strategy to other districts of Nakaseke, Nakasongola, Kamuli, Hoima and Masaka , learning from the pilot districts of Mukono and Kayunga where he project pilot has performed well. The workshop also enhanced the participants’ skills in gender responsive communication and appreciation of the crucial role of gender in the biological control activities.

Dr. Caroline Nankinga the Principal Investigator of the Project observed that the project is scaling out to other districts working with CABI Pantwise +. Explaining the genesis of this plant pest, she says the attack started about 2016- 2017 but was not reported but farmers realized it had established in their Papaya fruit trees. “It is a new evasive pest from Southern America that destroys the fruits, leaves. It sucks the juice from the Papaya fruits and the sap from the Papaya leaves. This deforms and wilts the leaves making it hard for them do photosynthesis so the plant eventually dies because it cannot make food anymore. It can cause up to 70-100 percent loss if not managed”. Read more about this from this link <https://www.monitor.co.ug/uganda/magazines/farming/how-to-control-papaya-mealybug-4792162>



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### Dr. John Adriko Bids Farewell to BBP at NARL and joins NaFORRI



*Left: Dr. Wasswa Mulumba the Curator of Botanic Gardens and Gene bank with Dr. Tindamanyire Jimmy the new Program Leader for the BBP hand over a gift to Dr. John Adriko at the farewell party. Middle Dr. Wasswa Mulumba holds the outgoing PL and incoming PL in prayer as Dr. Priver Namanya hold the Microphone. Right: Cutting cake to celebrate the good working relationship.*

Dr. John Adriko has been appointed Director of the National Forestry Research Institute (NaFORRI), succeeding Dr. Hillary Agaba. A plant microbiology and molecular biologist with a PhD in Molecular Plant Pathology from the University of Copenhagen, a Master's Degree in Crop Science and a Bachelor's Degree in Agriculture from Makerere University. John has more than 15 years' experience in medicinal plant research, plant disease diagnostics and management, agricultural and environmental biotechnology, genetic resources utilization and conservation and phytochemical profiling and product development. Prior to the new appointment, he held various positions as a Plant Molecular Biologist and was subsequently promoted to level of Principal Research Officer at the National Agricultural Research Laboratories (NARL), where he held the leadership function of Programme Leader for the Biodiversity and Biotechnology Programme (BBP), providing direction and oversight for research in biodiversity, integrated pest management and biotechnology.

He chairs the taskforce of the NARO Laboratory Accreditation Committee, supporting the development of quality management systems for NARO laboratories and accreditation process. He is the taskforce leader for the establishment of the Regional Gene Bank. He led and contributed to research in the development of plant-based crop protection solutions; tissue culture systems for medicinal and high-value plant species, disease diagnostics, bio pesticide formulations for pest management; development of algae-based animal and fish feed products and an ICT tool for linkage of the National Gene bank to Community Seed Banks. He serves on several committees and task force teams, such as the task force for the establishment of the National Sugar Research Institute (NSRI), the NARO Institutional Animal Care and Use Committee; and the Working Group on Plant Genetic Resources Management (WG-PGRM) of the African Seed and Biotechnology Platform for the African Union Commission (AUC), among others. Dr. Jimmy Tindamanyire is the new appointed Program leader for the Biodiversity and Biotechnology Program at NARL.

NARL also received a new staff Ms. Catherine Gracious Namuyimbwa who heads the Planning, Monitoring and Learning Unit.