



Capacity Building Compendium

SCIENTISTS TRAINED

Table of Contents

03

Burkina Faso's Success Stories

07

Ethiopia trained scientists' stories

13

Some AGRA Graduates in Ghana

16

Nigeria Capacity Building success stories

22

Success stories from Rwanda

25

Tanzania's trained scientists' stories

28

Improved MSc in Cultivar Development – Stories from beneficiaries

Burkina Faso's Success Stories

01

Dr. Valentin S. Edgar TRAORE,
Senior Research Scientist working with the National
Institute for Research on Agriculture and the
Environment (INERA).



Dr. Valentin S. Edgar TRAORE is a Senior Research Scientist working with the National Institute for Research on Agriculture and the Environment (INERA). He is now a principal rice breeder based at Kamboinse Research Station. He graduated in 2013 with a PhD degree from the West African Center for Crop Improvement Institute (WACCI), University of Ghana, Legon. His research activities are mainly focused on developing new high yielding rice varieties with good grain quality and resistance/tolerance to diseases. Getting back home after his PhD, Dr. TRAORE received a grant award from AGRA to the tune of US\$150,000 for a project titled "Development of farmers' preferred rice varieties resistant to Rice yellow mottle virus (RYMV) and participatory varietal selection (PVS) in Burkina Faso ". This project aimed at developing and releasing new, adapted, and high yielding rice varieties with resistance/tolerance to RYMV and enhancing farmers' access to high yielding, disease resistant and user-preferred grain quality traits. Under this project, over 10 new rice varieties were developed and four have been released to date. The 4 new varieties are KBR2, KBR4, KBR6, KBR8.

In 2018, he received another grant award from AGRA of US\$243,000 in the frame of a rice consortium for a project titled "Competitive & Inclusive Rice Value Chain Development: Rice Marketing and Production Systems Enhancement Project ". The aim of this project is to contribute to increasing rice productivity among small-scale farmers and to ensure the availability and accessibility of early-generation seeds. In this project he is producing early generation seeds of the released varieties helping to commercialize and popularize them in smallholder farmers' fields. He was appointed in 2015 by his Institute to spend 20 percent of his working time as a Seed Expert with Smallholder Agricultural Productivity Enhancement Program for Sub-Saharan Africa (SAPEP) funded by IDB. Also, in 2018, he was selected as the focal point of The African Seed Access Index (TASAI) in Burkina Faso. Dr. TRAORE was the deserving recipient of an award from African Plant Breeding Academy. In his home country, He received the Knight of the Order of Academic Palms. He is also an active member of the African Plant Breeding Association and the African Society of Geneticists.



Dr Edgar Traore in his rice trials at INERA Kamboinse,
Two new varieties - BR 2: 116 days, Yield: 8-9t/ha, Ecology:
lowland/irrigated and KBR6 : 118 days, Yield : 8-10t/ha,
Ecology: lowland/irrigated

02

Dr. Idriss SERME,
Senior Agronomist, INERA



He graduated in 2013 with a PhD degree from the Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana. As a soil scientist, Dr. Serme is currently the Head of Biometry Division. He is leading an important project supported by European Space Agency under Tiger Project 402 and German Federal Ministry of Education and Research. Apart from his current position, he is also a senior lecturer at the Institute of Rural Development of Burkina Faso. Furthermore, through his Division, he supervises postgraduate students. Dr. Serme is also actively involved in the AGRA Microdose project. Under this project, relevant publications were delivered.

03

Dr. Koussao SOME,
Senior Research Scientist and lead sweet potato breeder, Department of Crop Research, INERA



He graduated in 2012 with a PhD degree from the West African Centre for Crop Improvement Institute (WACCI), University of Ghana, Legon. Dr. Some is currently the Head of Research Program on root and tuber crops at INERA. After his PhD, Dr. Some obtained a grant award from AGRA of US\$177,500 for a project titled "Participatory Breeding of Orange-fleshed Sweet potato Adapted to Savannah and Sahelian Environment of Burkina Faso", with the aim of developing, orange-fleshed sweet potato (OFSP) varieties that could contribute towards enhancing household food security and alleviating malnutrition and poverty in Burkina Faso. With AGRA support, eight (8) OFSP varieties were developed and released and are effectively used by farmers. Dr. Some has led many projects mainly funded by the Bill and Melinda Gates Foundation (BMGF) in collaboration with the International Potato Center. Currently, he is coordinating grants from the International Atomic Energy Agency (IAEA) on "Enhancing Productivity and Climate Resilience in Cassava-Based Systems through Improved Nutrient, Water and Soil Management (AFRA)" and another project from the BMGF through CIP entitled "SweetGAINS - Genetic Advances and Innovative Seed Systems for Sweet potato". Dr. Some is also the former West Africa Representative (2013-2016) for the African Potato Association (APA).



Dr Koussao Some and 2 of the 8 varieties, 1st one Nooma 15-20 t/ha and Tiebele 2, 20-25t/ha and purple flesh line in the pipeline. All his released varieties had 25-28% dry matter content. Most of the varieties have moderate tolerance to full resistance to sweet potato virus disease (SPVD).

04

Dr. Inoussa Drabo,
Senior Research Scientist, National Institute for
Research on Agriculture and the Environment (INERA)



He is a senior pearl millet breeder at INERA in the Crops Research Department. Under an AGRA postgraduate sponsorship, he graduated in 2017 with a PhD degree from the West African Center for Crop Improvement Institute (WACCI), University of Ghana, Legon. Dr. Drabo is currently leading in two major projects. One of them is development of cytoplasmic male sterility (CMS) maintainer population with durable downy mildew resistance with the following goals: i) to develop downy mildew resistant pearl millet hybrid seed parents, and ii) to develop high yielding downy mildew resistant pearl millet hybrids. The other one is enhancing improved variety adoption with the goal of identifying constraints and other factor that affect adoption of improved varieties. He has currently released the first hybrid pearl millet variety in Burkina Faso called Nafagnon. He also released 2 other OPV varieties called Konkosbougua and Laada.



Dr Drabo's hybrid pearl
 millet Nafagnon

05

Mr. Hamadou SIDIBE,
Plant breeder and a member of the research team of
cowpea breeding at the Environmental Institute for
Agricultural Research, (INERA)



Hamadaou is a current PhD student at the University of Ouagadougou (2017-2021 and has a master's degree in plant breeding which was obtained in the collaborative partnership between AGRA and University of Ouagadougou. Under this partnership, master students were trained in plant genetics and soil science. Mr. Sidibe is also a 2019 Winkler Family Foundation Fellow. Through this fellowship, he is currently pursuing a part of his PhD research at Cornell University in the United States of America. Hamadou is involved in two projects of INERA focusing on organic and bio-fertilization as well as drought tolerance in cowpeas.

06

Dr. Abdalla Dao,
Senior Research Scientist & Maize breeding specialist,
(INERA)



He completed his PhD degree in Genetic and Plant Breeding from the West Africa Centre for Crop Improvement (WACCI) at the University of Ghana. This PhD program was fully supported by AGRA. Over the past seven years, Dr. Dao has been coordinating the creation, evaluation, and dissemination of improved maize varieties and working with farmers and NGOs in designing and implementing agricultural development projects. He also serves as a mentor and contributes to the capacity building of many agronomists. Dr. Abdalla was one of 100 Fellows competitively selected to participate in an eight-week internship program in the United States under the Mandela Washington Fellowship for Young African Leaders. To date, Dr. Dao is actively involved in ongoing research activities supported by AGRA towards maize variety improvements, release, and commercialization. Furthermore, he is a member of the national research team of the project “Irrigation Scheduling with Drought-tolerant Quinoa: The Case of Burkina Faso”

Ethiopia trained scientists' stories

AGRA funded the training plant breeding, seed and soil scientists from Ethiopia who are placed in various agricultural institutions in the country. Below are some stories from the trained scientists

01

Mr. Netsanet Abera,
Trained Scientist, AGRA



Netsanet Abera is an AGRA trained scientist who graduated with an MSc degree in Plant Breeding and Seed Systems at Makerere University in 2018. He is working for Pawi Research Center (Benishagul Gumuz). The region is lowland with a high rainfall and hot temperatures. Its diverse agro-ecology provides potential for cultivation of different cereals (maize, sorghum and finger millet), which are the most important staple food grains cultivated in the zones. The region has high potential for, as well as expected to be center of, sorghum diversity. But the potential is less exploited due to multiple barriers.

Despite the agro-ecological suitability for sorghum and millet production, productivity of sorghum has remained about 2.2 tons and finger millet 1.6/tons per hectare. The productivity is constrained by head and leaf blast diseases, lack of improved varieties, lack of awareness on the nutrient composition and value of finger millet on human health and crop management. Mr. Netsanet has developed two sorghum varieties that are recommended for release and dissemination in the area and one finger millet variety through the following activities with his peer group.

Sorghum: Mr. Netsanet together with his peers collected and tested landrace sorghum accessions as regional variety trial in three locations. Promising genotypes were identified; 15 promising regional landraces are already sent to national coordinating center to be included as NVT. Two varieties (Melkam and Bonsa) with average yield of 3.5 and 3 tons respectively were recommended for production after checking their adaptability in four locations.

Finger millet: Germplasm collection was done in 2012. Starting from nursery observation to RVT for 3 years in two locations. One candidate variety has been selected for release released in 2020 by name of Pawi Ag. At the Research Center, about 45 genotypes have been planted for screening against blast disease. There is also chemical evaluation of registered fungicides for Blast disease. He released his first finger millet variety with an average yield of 2.8T/ha that is resistant to both leaf and head blast. The variety has a potential yield up to 3.8t/ha in some environments.

Mr Netsanet said “The support through AGRA and Makerere University made me who I am today. I am very grateful to all who helped me through this journey”.



02

**Dr. Tigist Sheferaw, (PhD at ACCI graduated in 2018):
Bean Breeder, Melkasa Research Center**



She participated in the national beans strategy development and is currently coordinating a CIAT project (country level for breeding) that is financed by Bill & Melinda Gates. Because of her innovative and promising achievements, the Ethiopian Agricultural Research Council Secretariat provided her additional research leadership training at the Ethiopian Airlines School. She has contributed to the development of a few pest resistant bean varieties, which are in their final evaluation stages and in the pipeline for release.



Dr. Tigist Sheferaw in her bean breeding program in Ethiopia

03

**Dr Ermias Abate, (PhD at ACCI graduated in 2016):
Amhara Agricultural Research Center**



He currently works at Amhara Agricultural Research Center. He pursued his PhD training on AGRA sponsorship at the Africa Centre for Crop Improvement (ACCI) University of KwaZulu-Natal, South Africa. During his training he acquired skills in conventional and modern plant breeding, knowledge and skills on communication, leadership, scientific paper writing, statistical analysis, and special Participatory Rural Assessment (PRA). These practical skills training enabled him to design and implement real problem-solving research activities. He testifies that ACCI's training program had superior quality; the lecturers were world class with ample theoretical and practical experiences and have deep understanding on Africa's seed sector that is not comparable with any form of training in the local universities. Dr. Abate was promoted from being a researcher to Director General of the Amhara Region Agricultural Research Institute (ARARI) when he returned from his PhD studies. He introduced Early Generation Seed production as a business using skills, he acquired during the breeding course in South Africa. As a breeder, he has pioneered the development of genetic variability of teff for aluminum toxicity tolerance and developed two grain oat varieties for acidic soil environment. He is also working to convince leaders in the regional Bureau of Agriculture (BoA) to increase the acceptance of high yielding oat grain to be grown in areas where acidic soil dominates.



Dr Ermias in his teff breeding program in Amhara

04

**Dr Solomon Assefa, (PhD at ACCI graduated in 2018):
Deputy Bureau Head, Amhara Bureau of Agriculture**



After completion of his PhD at the ACCI, the Regional Government assigned him to oversee and direct the regional research endeavors. He attributed his success in this role to the AGRA funded training program that created in him the realization that he could make a difference in the sector. As Assefa expressed, specific competencies he acquired during AGRA-sponsored training include; high level breeding technique, especially by using PRA, how location specific varieties will be selected, and knowledge on genomics marker assisted selection assisted him to be a preferred person for this role. As a breeder he contributed with his research team to the release of three sorghum and two teff varieties and two maize varieties in the pipeline. Besides, he impacted the regional agricultural research system through provision of advisory service to the regional government, agricultural sector leaders and research community to avoid non-evidence based and subjective decisions.



Dr Solomon Assefa in his sorghum breeding program in Amhara and with supervisor Prof Hussein Shimelis

05

**Netsanet Bacha, (PhD at ACCI graduated in 2014):
Plant Pathology Program Coordinator and National
Wheat Rust Early Warning System Coordinator, EAIR**



She was trained on wheat breeding and pathology. She was also further trained in pesticide & plant quarantine research. She attests to the immense benefits of the AGRA-supported training, noting that the knowledge she gained could not be obtained from any conventional training approach. She has contributed to development of a plant pathology and quarantine research strategy together with the team. Because of her excellent performance, she was promoted to Plant Pathology Program Coordinator and National Wheat Rust Early Warning System Coordinator. Wheat rust disease forecasts help in minimizing the potential risks of crop loss. Her skill obtained from training enabled her to evaluate the quality of imported pesticides for their efficacy. This has an immense contribution for ensuring quality of pesticides distributed for farmers.



Dr Netsanet breeding wheat at Ammo Research Station before her promotion to EIAR Headquarters

06

**Dr Fekadu Gurmu, (PhD from ACCI Graduated 2016):
National Root Crops Research Programme Coordinator,
South Agricultural Research Institute, Hawassa
Ethiopia**



Dr Fekadu Gurmu has two sweet potato varieties released in Ethiopia recently that had been chosen by 5000 farmers as their top choices out of 12 varieties. Farmer support is important because if they do not adopt a new variety the cost of its development is wasted. Gurmu is the coordinator of the National Root Crops Research Programme at South Agricultural Research Institute in Hawassa, and the two varieties that were released were developed from work that he started for his PhD in 2013. He crossed white-fleshed varieties that had high root dry matter content, which is favored by consumers, with orange-fleshed sweet potato (OFSP) varieties that were rich in beta-carotene but had not been adopted by farmers because they lacked the high root dry matter trait. Beta-carotene is a precursor for Vitamin A and an important addition to the diets of people who do not have access to quality nutrition, as it can prevent blindness and a range of other ailments. Gurmu's new varieties have both characteristics as well as high root yield and some resistance to sweet potato virus disease. He has published 28 articles.



07

Rebeka Gebretsadik Teshome (PhD at ACCI Graduated 2014)
Seed Systems Advisor for GIZ, Ethiopia.



The parasitic weed *Striga hermonthica* causes losses of 30-100% of sorghum crops. For her PhD research project Dr Rebeka Gebretsadik Teshome consulted with farmers about constraints and found that the effect of *Striga* was significant for most of them.

She evaluated sorghum genotypes for compatibility with *Fusarium oxysporum* inoculation in *Striga*-infested soil, and overall integrated *Striga* management (ISM). Overall, her study established that ISM is effective in boosting sorghum productivity and identified useful parents and crosses for effective sorghum breeding to control *Striga* in Ethiopia.



Dr. Tigist Sheferaw
 on her farm

08

Dr Hirut Getinet, (PhD at ACCI graduated in 2016):
CIP, ILRI Campus, Addis Ababa

She was initially a staff of Gonder Agricultural Research Center at Amhara Agriculture Research Centre. But currently she is working at CIP, ILRI Campus, in Addis Ababa. Her PhD research work was partially supported by CIP potato program. She has experience in developing varieties for drought resistance and blight screening. The AGRA sponsored training raised her knowledge and enabled her to move to higher-level research. However, she is still collaborating with her original station and other NARS providing training for researchers, sharing their success factors, and establishing high-level cooperation in potato research. She contributed to the generation and release of improved potatoes varieties from the lines generated in her PhD research from CIP. Twenty-six of the genotypes are currently under further testing by NARS. Some of these will soon be released. There are two varieties in the final stages of testing before release that emanates from her work. Dr. Hirut has played an instrumental role in enhancing potatoes research network particularly within Africa.

09

Mizan Abreha, (PhD at ACCI graduated in 2017):
Cereal breeder, TARI station, Mekele Center

During her AGRA-sponsored training, she acquired multiple competencies. Accordingly, she started crossing cereals (teff and wheat), at TARI level. Her thesis work emanated from her previous engagement in teff breeding in the country. From the teff lines used since then, some have reached PVT and next year to RVT. There are two teff varieties expected to be released for Tigray in the next several months. Her thesis work enabled the materials to reach in Regional Variety Trial (RVT) stage.

10

**Zelalem Zewdu, (MSc training at Makerere University):
Fogera Research Center**

AGRA contributed to rice breeding by funding the training of breeders like Zelalem Zewdu who is working at Fogera Research Center. He benefited a lot and acquired new knowledge on breeding rice from his MSc research work. The training was supported by senior breeders from Ghana and South Africa who have in-depth understanding about the commodity. Since his graduation in 2017 he joined the Center and is working with the rice research team. He participated in upland rice variety development. He has one rice variety that is ready for release and several others have reached the NVT level. Though research is teamwork, the graduate made an important contribution in the development of the new varieties.

11

**Mr. Khalid Ibrahim, (MSc training at Haramaya University):
Regional Crop Director, Somali Pastoral and Agro-Pastoral Research Institute (SoPARI)**

Somali Regional State is one of the lowland regions with high livestock and crop potential but far removed from the center, with limited accessibility. The Somali Pastoral and Agro-Pastoral Research Institute (SoPARI) did not have a seed research division till an AGRA graduate recently launched the activity after completion of his training. Mr. Khalid Ibrahim gained an MSc degree in Seed Science at Haramaya University. He was promoted from a junior researcher to the Region's Crop Director when he returned to the center. He currently coordinates seed enterprise of the region as well as serve as a part time lecturer on seed science at Jijiga University over the past five years. Though still small, the seed science research at SoPARI coordinates several projects including agro-pastoral seed system analysis developed for the region and contributed to the preparation of regional seed law & regulation. As a single expert for the region, Mr. Khalid participates in policy document preparation for agricultural development of the region.

12

**Kedir Oshone, (MSc training Haramaya University graduate):
Divisional Head for Technology Multiplication & Seed Science,
Melkassa Agricultural Research Center**

An AGRA trained scientist from Melkassa Agricultural Research Center, Kedir Oshone, acquired knowledge on proper seed technology having been trained on International Seed Testing Association (ISTA) standard which was never used previously in the country. He was promoted to division head for technology multiplication and seed science in the center. He produced a seed sector strategy document with his peers for the center. By applying ISTA standard of tef, maize, sorghum and beans can now be produced. Kedir's team established internal quality control in the field and laboratory level. He also conducts training for unions and NGOs who are engaged in seed multiplication.

Some AGRA Graduates in Ghana

01

Dr. Maxwell Darko Asante,
Senior Research Scientist working with the National Institute for Research on Agriculture and the Environment (INERA).



Dr. Maxwell Darko Asante is a Senior Research Scientist (lead rice breeder) with the CSIR-Crops Research Institute (CRI) located in Kumasi, Ghana. He graduated in 2013 with a PhD degree from the West African Centre for Crop Improvement Institute (WACCI), University of Ghana, Legon. A year later after his graduation, Dr. Asante received a re-integration grant award from AGRA to the tune of US\$184,700. These funds helped him to purchase critical equipment to facilitate rice breeding activities (such as a pickup vehicle, a power tiller, and a laboratory rice milling machine) and to develop new rice varieties of high yielding, disease resistant and consumer-preferred traits suitable for the lowland and upland ecologies of Ghana.

Since graduation, Dr. Asante has to his credit 27 publications including 17 journal articles, three chapters in books, three manuals, and four conference paper abstracts. His research has led to the identification of molecular markers that could be used effectively and efficiently to improve quality characteristics in rice. In particular, he has developed techniques to enable the incorporation of traits that farmers and consumers prefer into varieties with high yields and tolerance to biotic and abiotic constraints. His breeding activities has led to the release of 7 lowland/irrigated rice varieties that are commercialized. Many farmers could come out of poverty through the cultivation of these superior rice varieties because rice is basically a cash crop in Ghana and the returns on investment is very high. Besides, up to three crops per year can be produced in the rainfed lowland and irrigated ecologies. His breeding work has leveraged additional funding amounting to approximately US\$ 1 million from other donors. The dissemination and adoption of these new varieties by farmers will go a long way in supporting Ghana's rice import substitution policy.

Dr. Asante was the deserving recipient of the best research scientist at CSIR-CRI in 2017 and subsequently the best national agricultural researcher in Ghana in 2018. Although he dedicates about 80 percent of his tenure to research, Dr. Asante is also a senior lecturer in plant breeding and genetics at the CSIR College of Science and Technology and a guest lecturer with the Pan African University, University of Ibadan, Nigeria. The researcher cum academic is a member of the Coalition for African Rice Development (CARD) Working Committee, member of the Internal Management Committee of CSIR-CRI, and President of CSIR-CRI branch of the Research Staff Association of Ghana.



Dr Asante in his rice fields at the Crop Research Institute in Kumasi

02

**Dr. Priscilla Francisco Ribeiro,
CSIR – CRI, Ghana**



Dr. Priscilla Francisco Ribeiro is currently working as a research scientist with CSIR-CRI. An AGRA scholarship awardee, Dr. Ribeiro graduated with a PhD degree in Plant Breeding from WACCI in 2016. Priscilla had earlier been sponsored by AGRA for MSc studies at Kwame Nkrumah University of Science and Technology (KNUST) from where she graduated in November 2010 and proceeded straight to WACCI for PhD in January 2011. Dr. Ribeiro's PhD dissertation was rated as one of the best in her graduating year and a brief of her research work was featured in the prestigious University Research Book.

Upon graduation, she joined CSIR-CRI as the first female maize breeder at the Institute and has so far published three papers in reputable journals as lead author. She has also co-authored four other papers and has one newly developed maize variety to her credit. The variety was officially released less than a year ago and is still being promoted. The ever-smiling researcher is currently involved in developing new inbred lines for CRI maize breeding programs, writing technical publications, and undertaking farmer outreach activities. She has since supervised two AGRA-sponsored MSc students enrolled at the nearby KNUST and is actively involved in training programs for farmers and extension officers on maize cultivation and hybrid development.

Dr. Ribeiro was appointed the coordinator for Ghana for the Stress Tolerant Maize for Africa (STMA) project and led her project team to win the best breeding award for Ghana and the best national partners' award for West Africa. A member of internal audit team for ISO accreditation of biotechnology laboratory at CSIR-CRI, Dr. Ribeiro also became a fellow of the Gender Responsive Researchers Equipped for Agricultural Transformation (GREAT) and hopes to gain exposure as well as knowledge and skills in this network to integrate gender responsiveness into maize research and production.



Dr Priscilla in her field in Kumasi and with her baby celebrating her graduation

03

Dr. Allen Opong,
CSIR-Crops Research Institute, Ghana



Dr. Allen Opong is a Senior Research Scientist with the CSIR-Crops Research Institute (CRI), in Kumasi, Ghana, specializing in plant breeding and plant pathology (virology option). He was awarded an AGRA scholarship for PhD studies at WACCI, University of Ghana, Legon, where he graduated in 2013. Upon graduation, Dr. Opong resumed his research tenure at CSIR-CRI and obtained a re-integration grant of US\$135,000 from AGRA to produce early generation (breeder and foundation) seeds of maize, soybean, and cassava in support of the Government of Ghana's Planting for Food and Jobs campaign. The seeds produced are being supplied to certified seed growers to produce certified seed for farmers in Ghana. Dr. Opong has published 12 journal articles and contributed to one book chapter. He has also supervised one PhD student and six MSc students. In 2018, he developed two new single cross and one new three-way hybrid maize varieties, the latter for Africa Seed Company, Ghana Limited. In 2016-. In addition, he assisted his colleagues to release improved varieties of cocoyam, taro, rice for use and cultivation in Ghana. He is also the country leader for the West African virus epidemiology (WAVE) for root and tubers crops project in Ghana a program dedicated to ensuring food security in West and Central Africa.

04

Dr. Samuel Abebrese,
Plant Breeder (MSc 2010, (KNUST), PhD 2016, (WACCI))



Dr Abebrese undertook cross compatibility studies of the new rice for Africa (NERICAs) for his MSc thesis. For the PhD, he studied the prospects of hybrid rice in Ghana. He undertook a participatory rural appraisal to assess farmer preferred traits and the potential for hybrid rice adoption in Ghana and evaluated several hybrids from both private and public institutions to identify the ones with above 15% yield advantage over the best inbred variety (AgraRice). He also assessed the possibility of identifying parents (maintainers and restorers) from local germplasm for in-house hybrid rice development through the three-line system. He also studied the application of anther indehiscence and stigma exertion in hybrid rice breeding and mapped the genes for anther indehiscence and stigma exertion in CRI-48 and Jasmine 85 cross of rice (*Oryza sativa* L). His research has led to the release of 6 rice varieties (2 hybrids, 4 inbreds) in Ghana. Five journal articles and one monograph. He is now leading the rice improvement program of the CSIR-Savanna Agricultural Research Institute, Tamale, Ghana where he leads the development and testing of new rice genotypes in the Northern savanna zones of Ghana. His team is responsible for the production of early generation (breeder and foundation) seeds of released rice varieties. He is member of the National rice taskforce.

His program contributes about 70% of the rice foundation seed needs of the government of Ghana's "Planting for Food and Jobs" program. The use of quality rice seed has led to about 50% yield increase in farmers' fields and resulted in increasing domestic rice production and reducing rice imports to Ghana.

"My training at WACCI is a dream come true. I have been positioned as a qualified plant breeder to contribute to Ghana's agriculture and Africa's agriculture in general. I am so excited to be helping to address some of the critical challenges facing farmers and ending food insecurity in Africa".

- Dr. Samuel Abebrese

Nigeria Capacity Building success stories

01

Dr. Dorcas Olubunmi Ibitoye (PhD WACCI 2015), Chief Research Officer, a member of the Grants and Partnership Unit, (NIHORT).



Dr Ibitoye conducted her PhD study to understand the underlying genetic factors controlling drought tolerance in Cowpea to effectively breed for drought tolerance and develop improved cowpea varieties which is critical for sustainable food and nutrition security in Nigeria. She conducted her thesis research at IITA, and the results of her work contributed to the knowledge of genetics of drought tolerance in cowpea and have been incorporated in the IITA cowpea breeding program. Part of the thesis research received the 2nd and 3rd prizes in the TEEAL/I TOCA post-graduate TEEAL research paper in 2015 for West Africa and Africa region respectively.

Her work institution NIHORT, however, has no mandate on cowpea research, she has therefore applied the science she learnt at WACCI to tomato breeding. This is strategic since Nigeria had no indigenous breeding pipeline for tomato but depends on imported and test varieties from multinational companies. Her work focusses on developing tomato varieties tolerant to devastating pest *Tuta absoluta* ('tomato ebola') as well as integrated pest management methods for the control of the pest. Dr. Ibitoye is currently a Chief Research Officer, a member of the Grants and Partnership Unit at NIHORT. She was the recipient of the African Union award totaling \$186,000 (from WACCI and IITA consortia), the BASF-NUNHEMS, India Private Ltd grant award of \$4,988, a grantee of the African Women in Agriculture and Development (AWARD) for 2014 and Fellow of the African Plant Breeding Academy (AfPBA), Class III, 2017.

As a plant breeder, Dr. Ibitoye has been able to initiate a tomato breeding program that is currently at F4 stage of development of improved varieties adaptable to humid environment. She has also been able to complete the rehabilitation of the medium-term gene bank to functionality with funds from the Federal Government to NIHORT. Dr. Ibitoye has to her credit, 17 scientific papers in peer-reviewed journals and has presented 10 papers at different national and international conferences. She is also currently co-supervising three doctoral and three master's students at University of Ibadan, Federal University of Agriculture Abeokuta (FUNAAB), Abeokuta and Ladoke Akintola University of Technology, Ogbomosh.

“I am highly privileged to be part of this programme as it has afforded me the life-time opportunity to expand my knowledge and skills in the art of plant breeding. This programme had increased my network circle a great deal and improved my visibility which is tremendously helping the positive advancement of my career. Being part of this programme helped me to develop a strong passion to work directly with farmers right from the start of my breeding programmes”.

- Dr Dorcas Ibitoye

02

**Dr. Akaogu, Ijeoma C. (PhD in Plant Breeding, WACCI 2017),
Project Manager of the NABDA-BIOCROPS partnership**



Dr Ijeoma Akaoga was a beneficiary of the AGRA MSc scholarship program at the University of Ibadan (2010 – 2011) and subsequently the doctoral program at the West Africa Centre for Crop Improvement (WACCI), a partnership between University of Ghana, Legon, Ghana and Cornell University Ithaca New York, USA (2014 – 2017) working on maize breeding. Ijeoma is currently a research scientist with the National Biotechnology Development Agency in Abuja. In 2013, she won the third prize position with her M.Sc. thesis in the 3rd Africa-wide Women and Young Professionals in Science Competition in Accra, Ghana. She was the recipient of the USD 20,000 Norman Borlaug Leadership Enhancement in Agricultural Program (LEAP) award at Cornell University Ithaca New York USA (2016 – 2017). Dr. Akaogu is currently the only researcher having a PhD in plant breeding at NABDA.

She has identified three promising high yielding and stable maize hybrids with combined resistance - to Striga hermonthica and drought under on-farm trial prior to their commercialization and release in Nigeria and West Africa sub-region from a selection of over 156 Striga tolerant varieties released in the sub region. Recurrent drought and parasitism by Striga hermonthica Del. Benth constitute the two most important stresses limiting maize (*Zea mays* L.) production and productivity in sub-Saharan Africa (SSA). Yield losses can reach up to 85% when the two stresses occur simultaneously in the field. The use of resistant varieties is more sustainable, economical, and efficient for African farmers. Ten outstanding hybrids out of 156 hybrids evaluated were identified as candidates for further testing and commercialization in the Striga endemic areas with short duration of rainfall in West and Central Africa (WCA). These hybrids were tested in multi-location and on-farm trials to confirm the consistency in performance and promoted for release and commercialization in the sub-region. Three outstanding hybrids identified from her research work are presently be tested in multi-location and on-farm trials to confirm the consistency in performance and prior for release and commercialization in the sub-region. These outstanding hybrids when commercialized in Striga endemic and drought prone areas of WCA would contribute to increased maize productivity, poverty alleviation and reduced Strigaseed bank in the soil.

Presently, she is the Project Manager of the NABDA-BIOCROPS partnership, wish targets producing one to five million seed yams and yam seedlings using aeroponics, vine cuttings, temporary immersion bioreactor and semi autotropic hydroponics techniques for small holder farmers in Nigeria. The projects address the need to provide clean and disease free, improved yam planting materials in Nigeria. Dr. Akaogu has published 10 articles in peer-reviewed scientific journals and presented five papers at different conferences. She has supervised more than 5 students on industrial attachment in her institute working on pro vitamin A and quality protein maize for nutrition security in Nigeria.

“Nigeria, a country with vast arable lands, everybody should be engaged in agriculture as a business, and nobody should go to bed hungry in order to feed her ever growing population”.

- Dr. Ijeoma Akaoga

03

Dr. Ifie, Beatrice Elohor,
West Africa Centre for Crop Improvement
(WACCI), University of Ghana, Legon, Ghana



Dr. Ifie graduated with a PhD in Plant Breeding from the West Africa Centre for Crop Improvement (WACCI), University of Ghana, Legon, Ghana in 2014. Thereafter, she served as a Research Fellow, in the same institution from September 2014 – August 2016, before being promoted to the position of Maize Breeder, a position she held till December 2017. From October 2016 to May 2017, Dr. Ifie served as a consultant with the Alliance for a Green Revolution in Africa (AGRA). She is currently a lecturer at her alma mater, the West Africa Centre for Crop Improvement, a position she assumed in January 2018.

Dr. Ifie is the recipient of several grant awards. She collaborated in the US\$ 75,000 project on “Upscaling West Africa Centre for Crop Improvement Released Maize Hybrids for Increased Productivity in Ghana” from 2015 - 2017. Ongoing project collaborations include the African Union-European Union US\$ 1,000,000 grant on “Crop and soil health improvement for sustainable agricultural intensification towards economic transformation in West Africa” (2018 – 2021); the AGRA US\$ 249,991 grant on “Development, evaluation and promotion of selected maize hybrids in West African regions” (2018 – 2020) and the US\$ 15,000 grant from the Borlaug Higher Education for Agricultural Research and Development (BHEARD) (2020 – 2021).

Dr. Ifie has released three single-cross maize hybrids, has published 23 articles in peer-reviewed journals, and has presented two papers at conferences. She is an active mentor of females and youths in plant breeding and seed science and technology and is an executive member of the African Plant Breeders Association.



Dr Beatrice Ifie at WACCI
 breeding maize and training
 the next generation of plant
 breeders

04

**Dr. Adebayo, Moses Adeolu, (WACCI PhD in Plant Breeding 2013)
Seed Company Nigeria (Subsidiary of Seed Co International)**



Dr. Adebayo was a lecturer at Ladoku Akintola University of Technology (LAUTECH), Ogbomoso when he was awarded the AGRA Scholarship for a PhD program in plant breeding at the West African Center for Crop Improvement (WACCI), University of Ghana, Legon, which he concluded in 2012. His thesis area was breeding hybrid maize for tolerance to drought stress using exotic and adapted germplasm. Thereafter, he returned to LAUTECH and rose to the rank of Senior Lecturer before leaving in 2017 to join the Seed Co Nigeria as their Research and Products Development Manager. At LAUTECH, Dr. Adebayo was awarded a Senate grant of N230,000 to support his efforts at breeding maize hybrids for the derived savannah agro-ecology in Nigeria. The project led to the development of new experimental maize hybrids. He also received \$180,000 grant from AGRA to develop maize hybrids suitable for the derived savannah zone, using different combinations of exotic and adapted germplasm. This grant was later terminated in 2017 due largely to prolonged closure of LAUTECH on grounds of poor state funding.

Dr. Adebayo participated in the release of two maize varieties, the SC649 and SC612 in 2017 for the Seed Co, Nigeria. He also championed the release and registration of an early-maturing soybean, SC-SL01 variety for the Seed Co in 2018. The 3.1 t/ha product has been commercialized and is available to soybean farmers in Nigeria. Again, there are at least one soybean and three maize genotypes as pipeline products that are meant to be taken for on-farm testing in 2020 and subsequent release as new crop varieties in Nigeria. His partnership activities with the Maize Improvement Program of IITA, Ibadan, led to the identification of high yielding PVA-rich maize hybrids that Seed Co Nigeria is prospecting for release in the Nigerian market.

Dr. Adebayo has specifically led the activities of Seed Co Nigeria in a partnership with AGRA and other stakeholders in the critical area of promoting the adoption of improved and/or hybrid crop varieties. Through this activity, targeted farmers have access to improved seed varieties and good agronomic guidelines, leading to higher yields, improved incomes and better livelihoods. He is also leading his organization's partnership with IITA Go Seed, a business incubation platform that drives production of quality soybean foundation and certified seed with the objective of doubling farmers' productivity to 3 – 4 t/ha from the current 1 – 2 t/ha. Dr. Adebayo has to his credit 21 journal articles and conference papers.



05

Dr. Damian Njoku Ndubuisi (PhD Plant Breeding, WACCI, 2012)
Breeder at the National Root & Tuber Research Institute,
Umudike, Nigeria



Dr Njoku is a breeder at the National Root and Tuber Research Institute, Umudike in Nigeria and is currently coordinating cassava breeding and extension at the center. He is also the technical officer in-charge of Harvestplus cassava project since December 2012 till date, and a research partner to the Principal Investigator (PI) Next Generation cassava breeding project at NRCRI Umudike. He is leading work on breeding more high pro-vitamin A cassava varieties to meet farmers need/request in Nigeria. Malnutrition as a result of deficiency in Vitamin A is prevalent in Africa and Nigeria, and this leads to stunting, blindness and low immunity among others. Biofortifying most of the staple crops including cassava would in a small measure, address some of these health threatening challenges and that is the reason for the project.

His work at NRCRI with other partners including IITA scientists has contributed to the release of 6 pro-vitamin A cassava varieties in Nigeria. The varieties have high yield and dry matter content which contain high levels of beta-carotene and will serve as an important source of Vitamin A precursors in the diets of consumers when the advance genotypes are released in Nigeria. He also had 3 more cassava varieties in the pipeline for release. He recently won a PEARL grant of USD 446,000 to lead a project on “Elucidating the genetic basis and relationship of root post-harvest physiological deterioration tolerance and carotenoid levels in West African cassava germplasm”. Damian has published and presented 8 papers from his research.

Nigerian farmers have come to the realization that pro-vitamin A cassava is important to impact positively to their vision and well-being, especially their growing children.

Dr Damian Njoku states “WACCI Programme is the best education programme in West Africa region that cannot be forgotten in a hurry, the impact is too much to imagine.”



“WACCI Programme is the best education programme in West Africa region that cannot be forgotten in a hurry, the impact is too much to imagine.”

- Dr. Damian Njoku

06

**Dr. Solomon Olufemi Afuape (PhD Plant Breeding, WACCI, 2016)
National Root Crop Research Institute (NRCRI),
Umudike, Nigeria**



Dr. Afuape Solomon graduated in 2016 from the West African Center for Crop Improvement (WACCI) at the University of Ghana, Legon, with a PhD in Plant Breeding and has been working with NRCRI as a sweet potato breeder. Dr. Afuape is currently a Chief Research Scientist and Head of the NRCRI, Iresi Outstation in Osun State. He was the recipient of the AGRA PASS grant award of \$158,700 for sweet potato breeding. He was the Leader of the team that developed and released four novel sweet potato varieties, UMUSPO/1, UMUSPO/2, UMUSPO/3, and UMUSPO/4, all of which are rich in provitamin A, except UMUSPO2. He developed and is advancing 17 genotypes that combine high levels of dry matter, high beta-carotene and resistance to sweetpotato virus disease. These materials have reached advanced selection stage and are due for the final stage of pre-release multi-environment trials and on-farm trials in farmers' field. The data from these trials will be submitted for the eventual release of the most superior, farmer- and consumer- preferred genotypes as new varieties. These are expected to be concluded and new varieties released, if funding is available, by 2021. Dr. Afuape believes that the development, release and promotion of the provitamin A sweet potato varieties with the help of the AGRA PASS funding has helped to increase the popularity and acceptance of sweet potato by health-conscious members of the society, especially the middle class. It has also helped to initiate the export of sweet potato from Nigeria to European countries.

Dr. Afuape has published 31 scientific articles in peer-reviewed journals and has also presented not less than 28 papers at national and international conferences. He is presently a consultant with AgroPark Development Company, an agro-based firm that is interested in producing and processing OFSP variety, UMUSPO/3, for use in bakeries. His current research focus is on the development of new orange-fleshed sweet potato varieties that combine high beta-carotene with high dry matter, and drought tolerance. This new focus will extend the production latitude of the nutrient-dense provitamin A varieties into drought-prone areas of northern Nigeria, as well as adapt this sweet potato type to fit into local processing and food culture of varied communities. The high dry matter orange-fleshed sweet potato type will greatly impact the entire OFSP value chain as this nutrient-dense type adapts the extensive fries' industry, impacting community health in the process as more people accept and consume it in different food forms. The promotion of the pro-vitamin A sweet potato varieties that his team has released has led to the elevation of the status of sweet potato from a poor man's food to health security food which health-conscious middle class look out for right now.

The nutritional advantages led to its being adopted as part of the weekly menu in the Federal Government's School Feeding initiative for Elementary school pupils in Osun and a host of other states. This has provided a huge market that has enhanced sustainable rural economy as local farmers produce and supply the schools nearest to them. Also, for the first time, sweet potato vines are being bought by farmers from vine producers due to the premium attached to these varieties, leading to the development of sweet potato seed system in a sustainable manner. International NGOs such as Helen Keller International and the Catholic Relief Service have adopted and used it as food-based intervention program towards alleviating vitamin A deficiency in endemic areas of central and northern Nigeria.



“Simply put, the successes I have recorded to date is a testament to the fact that money spent on proper human resource development, which AGRA through WACCI afforded me, is a viable seed that will generate and repay the society and humanity a million folds”

- Dr. Solomon Afuape

Success stories from Rwanda

01

**Dr. Damien Shumbusha (ACCI 2018 and Makerere University)
Associate Research Fellow, Rwanda Agriculture Board (RAB)**



Graduated 2018 with a PhD from the African Centre for Crop Improvement where he was funded by AGRA. He was also funded by AGRA to do his MSc study at Makerere University. His post graduate work was on sweet potato.

Sweet potato is a valuable weapon in alleviating vitamin A deficiency, which causes blindness in millions of African children. Consumption of orange-fleshed varieties known to be high in beta-Carotene (a precursor to vitamin A) can help combat vitamin A deficiency, and Damien Shumbusha has developed and released three varieties of sweet potato with this important trait, as well as being high yielding. In addition, he has released five dual purpose varieties for both food and animal feed with a wide array of traits. These cultivars are developed to argument food and farming systems in Rwanda and are widely spread in Rwanda, particularly in the South and North provinces.

The varieties are high-yielding (about 8 -22 tons per hectare) and have high dry matter content (about 30%). They are also resistance to sweet potato virus diseases and alternaria bataticola blight. Shumbusha's achievements are especially notable, given that he released six of these varieties while working at the Rwanda Agriculture Board (RAB) before starting his PhD in 2013. He's back at the RAB, working as an associate research fellow in the root and tubers programme. He has published five articles.



Dr. Damien Shumbusha in his sweet potato fields in Rwanda

02

**Dr. Placide Rukundo, graduated 2016 with a PhD
Research Coordinator for the potato sub-program at
Rwanda Agriculture and Animal Research Board (RAB)**



Dr Placide Rukundo, the research coordinator for the potato sub-program at Rwanda Agriculture and Animal Research Board (RAB), has released five new varieties of sweet potato that are aimed at enhancing both farm productivity and the sweet potato value chain. The varieties are early-maturing, resistant to some diseases and adaptable to various climatic conditions in the country. They are also high yielding, producing about 30 – 40 tons per hectare, considerably above the national average of 10 – 15 tons per hectare.

Moreover, each of these varieties has unique attributes that fit into both agronomic and industry needs. For instance, while the heat-tolerant variety is suitable for the lowland areas of the country, the early-maturing one is more suited for the short-growing seasons. Some of the varieties are also suitable for the processing of potato chips and crisp production. Rukundo said this is the first time in almost three decades that sweet potato varieties of such attributes have been released in Rwanda. He has published 23 articles most of them in refereed journals.



Dr Placide in his sweet potato research with the team he worked with and the supervisor Prof Shimelis from the ACCI in South Africa.

03

Dr. Athanase Nduwumuremyi (ACCI 2017)
Head of Cassava breeding at the Rwanda Agriculture and Animal Research Board (RAB)



Dr. Athanase Nduwumuremyi graduated with a PhD from the ACCI in 2017 that was funded by AGRA. He was also funded by AGRA for his MSc work at the University of xxx. His PhD thesis research was on cassava.

Cassava is an important crop in Rwanda for food security and industrial use. In his PhD thesis Dr Athanase Nduwumuremyi tackled two of the main constraints facing Rwandan farmers wanting to grow cassava: the lack of high-yielding genotypes and post-harvest physiological deterioration (PPD), which causes major losses for farmers. Athanase also gathered extensive information from the farmers about their preferences.

His study provided the basis for a cassava breeding scheme in Rwanda, generating improved total carotene clones with delayed PPD and high yield. In 2018, Athanase and his team came out with two varieties of cassava to suit farmer-preferred traits of early-maturation, high yields and resistance to viral diseases. In 2019, seven more varieties were submitted for approval and release. These varieties are high yielding with dry matter content and starch for processing. Some are also designed to have a sweet taste for consumption and will be suitable for climatic conditions in the eastern province of Rwanda. Dr Athanase is the Head of Cassava breeding at RAB and he has published four books and 14 articles.

04

Dr. Clement Urinzwenimana (ACCI 2017)
Director of the Seed Unit & Secretary to the Variety Regulations Council at the Rwanda Agriculture & Animal Research Board (RAB)



Dr. Clement Urinzwenimana worked on bean breeding for his PhD and graduated 2017. He has released three varieties of common bean that are early maturing, high-yielding and produced different-sized beans. He is now the Director of the Seed Unit and secretary to the Variety Regulations Council at RAB.



Dr. Clemence & Rufaro Madakadze of AGRA in his PhD trials in Rwanda

Tanzania's trained scientists' stories

01

Dr. Kiddo Mtunda (PhD at ACCI graduated in 2010)
Principal Research Officer, Sugarcane Research Institute
in Kibaha, Tanzania



Dr. Kiddo Mtunda, did her PhD research on cassava, an important food security crop, focusing on breeding for high dry matter which is highly valued for cooking quality.

After graduation she worked on improving virus resistance (cassava mosaic disease and Cassava brown streak virus), high starch content and yield, breeding four new varieties that were released in 2015. She now works as principal research officer at the Sugarcane Research Institute in Kibaha, Tanzania. She has published 22 articles.



Dr Kiddo Mtunda with one of her cassava variety Chereko — with high dry matter content of 27–32%, matures in 9–12 months, and is resistant to CMD and CBSD.

02

Dr Lameck Nyaligwa (PhD at ACCI graduated in 2015)
Director of Hombolo TARI Centre,
Dodoma, Tanzania



Maize productivity in Dr Lameck Nyaligwa's home country, Tanzania, is very low due to various biotic and abiotic constraints. He has identifying these constraints, as well as farmers' priorities in Northern Tanzania which guided his breeding program. He has released one variety in 2016 that is high-yielding and drought-resistant. He has also published four articles on this research. He is currently the Director of Hombolo TARI Centre, located in Dodoma, Tanzania.



Dr. Lameck Nyaligwa
at Tari Hombolo

03

Dr. Emmanuel Mrema
(PhD at the ACCI, graduated in 2018)



Sorghum is crucial for food security in drought-prone regions, but it is seriously threatened by Striga, a parasitic weed that wreaks havoc on cereal crops across Africa. Two species affect these crops — *Striga hermonthica*, found mainly in the north, and *Striga asiatica* in the south.

For small-scale farmers, who can lose up to 100% of their crop, having access to sorghum that's resistant to this pest is a huge step forward, so the achievements of ACCI graduate Dr Emmanuel Mrema in this regard are particularly significant.

Mrema is passionate about this crop and he has spent years breeding for resistance to Striga and compatibility with *Fusarium oxysporum* f.sp. *strigae* (FOS), a fungal biocontrol agent. FOS is a host-specific parasite of Striga. While it doesn't harm sorghum it does work against various stages of the parasite. The FOS is applied as a seed coat. When the seed germinates, the fungus grows into the roots of the host as a symbiotic infection. It then suppresses the germination of the parasite, as well as attacking the Striga plants if they attach to the host.

Mrema has developed elite sorghum varieties that are high-yielding, Striga-resistant and FOS-compatible. Two of the new varieties are top performing and farmer-preferred. These are presently under National Performance Trial evaluation in Tanzania by the Tanzania Official Seed Certification Institute (TOSCI) for release. Mrema is in the final stage of FOS registration for commercialization in Tanzania. He has published six papers in accredited and high impact journals.



Dr Emmanuel Mrema in his sorghum fields at Tari in Tabora



Seed increase unit for one of the released varieties

04

Dr. Stephan Ngailo (PhD at ACCI graduated in 2016)
Ag. CEO, Tanzania Fertiliser Regulatory Authority (TFRA)



Sweet potato is a crucial food security crop for millions of Africans, providing an alternative source of calories during the annual “Hunger Gap”. It has a major enemy, however, in the sweet potato virus disease (SPVD), which can damage almost an entire crop. Dr Stephan Ngailo’s work focussed on breeding resistant varieties that are high yielding and early maturing, and he has published three articles on this research.

He is currently the acting CEO of the Tanzania Fertiliser Regulatory Authority.



Dr. Ngailo in his sweet potato breeding days

Improved MSc in Cultivar Development – Stories from beneficiaries

01

Mwila Chibanda – University of KwaZulu Natal Alumni From Zambia



My name is Mwila Chibanda. I was a student in the first cohort of the IMCDA plant breeding program at UKZN in 2015, funded by AGRA. My MSc research was to determine the Grain Yield Stability, Genetic Gain and Path Coefficient Analyses in Advanced Soybean (*Glycine max* (L.) Merr.) Lines. This was implemented at SeedCo in Zambia and Zimbabwe using material from their Soybean breeding program. I did my internship and thesis research at SeedCo.

The genetic gain findings of my study led to a complete overhaul of the soybean breeding program and a reassessment of breeding objectives, choice of parents and selection criteria. After completion of my internship in Harare, under the mentorship of renowned breeders Dr Jacob Tichagwa and Dr Hapson Mushoriwa, I was offered a research associate position on the soybean breeding team at SeedCo to implement the soybean breeding program in Zambia. Prior to my employment, all activities on soybean in Zambia were remotely planned and implemented from Zimbabwe.

Since taking up this role, we (Zambia team) have set up the first ever soybean crossing block, so that Seedco now has a fully-fledged soybean breeding program, creating diversity, developing populations and trials. Our first crosses were made in summer of 2016 and advanced through to F5 generation. Selections were made in April 2020 for advancement to trials. We now make crosses every summer. Besides the soybean program, I also assist the principle wheat breeder with evaluation of wheat and other small grain trials across Zambia.

Being exposed to BMS during my MSC studies has been very helpful as Seedco migrated to the use of BMS for all its breeding work in 2017. I was part of the team chosen to pioneer this change and I currently manage data for all our local programs, including the maize breeding program. I have had an opportunity to present and defend varieties to the release committee of Zambia and successfully had two varieties accepted for release. All these are invaluable experiences that would not have been possible without the foundation of the MSc Plant breeding program I received at UKZN and the AGRA funding to participate in it.



Cross pollination of soybean (left) during internship and standing in front of soybean trials March 2020 (right) and ready to put smiles on farmers faces.

02

**Ruth Magaleta: University of KwazuluNatal Alumni
From Malawi**



To start with, it was a privilege to be part of this esteemed program and I shall forever be grateful for the opportunity that I was given.

Before and after graduation, I tried applying for jobs both in the private and public sectors, in Malawi but I was not considered, so with all the knowledge and lessons that I acquired through the IMCDA program, I set up a farm. Through my internship with Proseed, I learnt a lot about horticultural crops, seed multiplication and production, so much so that I produce horticultural crops like tomatoes, carrots, lettuce, cabbage just to mention a few and supply at wholesale to retailers. I also produce bananas and maize.

I do the production all year round as I have an irrigation system powered by solar energy. Currently, I am in the process of acquiring more land so that I venture into the seed multiplication business with Dekalb, a seed company here in Malawi. In addition to crop production, I have incorporated animal husbandry, largely pig production, and it has served as a source of manure for crop production hence helping me reduce on production costs.



Some of the crops Ruth grows on her farm.

03

Lutangu Makweti - University of KwaZulu Natal Alumni From Zambia

My name is Lutangu Makweti and I am currently working for the Zambia Agriculture Research Institute as the National Legumes breeder. I was enrolled in the second cohort of the IMCDA program at UKZN in 2016 and worked on groundnut for my research. My areas of research included screening lines for groundnut rosette virus resistance and adaptability. The research also involved identification of traits in local varieties that needed to be improved by conducting a genotype by trait analysis of 11 landraces.

My internship was done with the International Crop Research Institute for the Semi-Arid Tropics (ICRISAT) based in Malawi. As part of my internship, I was attached to a USAID funded project called the Peanut Mycotoxin Innovation Lab (PMIL), which was operational in Malawi and Zambia.

Two groundnut varieties (ICGV SM 01711 and ICGV SM 01514) were recommended for release from my study and these have since been released as MGV 8 (2018) and MGV 9 (2019) respectively. The team I lead initiated the groundnut improvement program for the local varieties that were identified under my MSc research. The team continues to build a robust groundnut breeding program from materials evaluated and or generated from my thesis research. As a team we also released 2 pigeon pea varieties in 2018.

With my internship at ICRISAT, our collaboration (ICRISAT and ZARI) has since improved leading to ICRISAT donating a vehicle to our breeding program to help with mobility. I am currently a Co PI on a groundnut project that looks at enhancing the genetic potential of peanut production in Eastern and Southern Africa funded by USAID which is led by Uganda. Almost 5 tons of basic seed of the newly released variety (MGV 8) has been produced while one ton was produced for MGV 9 and is ready for take up.

I was selected and funded by AGRA through UKZN to make a presentation on my MSc thesis work at the first African Plant Breeders Association Meeting in Accra, Ghana in 2019, which went very well. The exposure was great and enabled me to meet many other scientists and learn a lot.



Lutangu in his groundnut research in the greenhouse and the field.



04

Nokwethaba Biyela - University of KwaZulu-Natal alumni From Malawi



I was in the 3rd cohort of the IMCDA program funded by AGRA at UKZN. I conducted my research and internship at SeedCo South Africa and Zimbabwe. My MSc research study was on evaluating Genotype by Environment Interaction and Traits Association in Maize Hybrids.

The research enabled me to assess the genotype by environment interaction (GEI) for grain yield and stability among experimental maize hybrids in Zimbabwe and Zambia and determine genotype by trait associations and the relationship between multiple traits. The study was a great success as it assisted in identifying 4 high yielding and stable experimental hybrids that were recommended for further evaluation in METs and the production target environments in Zambia and Zimbabwe.

After graduating for my MSc degree, I was employed at the University of KwaZulu-Natal as a Volunteering Intern by NRF/SAASTA. I gained several skills, including soft skills such as good communication, project management, liaising with stakeholders, hosting workshops and science shows for primary and high school learners.

In 2019 I got a job at Bayer as a Seed Product and Pipeline Delivery Intern. My responsibilities include ensuring that we deliver good quality, sufficient and high yielding seeds to the stakeholders, coordinating and assisting in all seed lab operations (shelling, labeling, bar-coding and packaging), coordinating and assisting in field operations (field layout, planting, data collection, sampling and harvesting), managing inventory, sorting and updating seed quantities. I also sample seed for lab fingerprinting (finger printing data), field data collection and analysis. Training, motivating and supervising seasonal workers. Diagnose diseased maize, prepare pathogen inoculum, inoculate and evaluate disease.

Working at a seed Industry has always been one of my goals. It has been a great privilege to have been exposed to the working environment in seed industries, both at SeedCo and Bayer as I can now link all the theory and all the knowledge I acquired during my MSc at the University of KwaZulu-Natal. The exposure has also enabled me to understand breeding in a broader sense, enabled me to work with small-holder farmers and commercial farmers, and build good relationships with the stakeholders. With all this exposure, theory and practice, I am now confident to say that I am a budding breeder, and I am highly grateful to AGRA, UKZN, Dr Rufaro Madakadze and Prof. Sibiya for such an incredible opportunity and exposure.



05

Josiah Chimwemwe – University of KwaZulu Natal From South Africa

In January 2017, I joined the two-year IMCDA program at the UKZN, funded by the Alliance for a Green Revolution in Africa (AGRA) and graduated in September 2019. Prior to joining UKZN, I studied BSc in Agronomy at the University of Malawi and worked for over 4 years, providing agronomic expertise to smallholder farmers under contract farming in Malawi.

The IMCDA program was a unique blend of one-year coursework with a yearlong internship and research at reputable research institutes in Africa, to equip students with hands on experience on plant breeding and seed production pipeline. During the study period, I travelled to Ghana for quantitative plant breeding training; Zimbabwe for seed system workshop hosted by SeedCo and attended the African Plant Breeding Association first meeting at the University of Ghana.

I also visited various seed companies and research institutes within South Africa. I did my internship with Agriculture Research Centre-Grain Crops Institute and conducted MSc research study on breeding for Low N stress tolerance in Maize. The course work, research work, internship experience and the exposure to different scientific gathering within and outside South Africa during the study period technically equipped me to handle any challenges related to plant breeding and seed systems, which I can face along my career path.

Having studied MSc Plant Breeding UKZN under IMCDA, several career opportunities opened up. I got my first job with International Institute of Tropical Agriculture (IITA) as Technology Transfer Specialist in November 2018 toward the completion of my research work. With IITA, I was also involved in conducting cowpeas breeding trials as well as production of early generation seed for cowpea and soybean. Effective 1st September 2019, I got a new job within the Malawi seed industry with SeedCo Malawi Limited working as Seed Production Officer (Seed Inspector) involved in hybrid maize and legume seed production.

Outside SeedCo work, I technically backstop a family seed business investment which is owned by my father. Benefiting from Seed production and seed business expertise I acquired from IMCDA program, my father is currently among the big growers of soya bean basic and certified seed in Malawi for the government released soybean varieties called Tikolore and Makwacha. This is also my original contribution towards widening access to the seed of improved government released soybean varieties by the smallholder farmers in Malawi and Zambia. My future career plans are to continue working within the seed industry while also exploring PhD scholarship opportunities in Plant breeding and Seed Systems.

Special thanks to IMCDA project manager Prof Julia Sibiyi and AGRA for funding my studies. Special acknowledgement should also go to Dr Kingstone Mashingaidze, Dr Cousin Musvosvi and Dr Amelework Beyene Assefa for their significant technical contributions towards my studies.



Josiah at Agricultural Research Centre for his research and internship and at SeedCo in Malawi where he works

06

McDonald Nundwe University of KwaZulu Natal Alumni From Malawi



I enrolled for MSc. Plant Breeding at the University of Kwazulu-Natal, Pietermaritzburg campus in South Africa in 2016 with funding from AGRA. It was a two-year program.

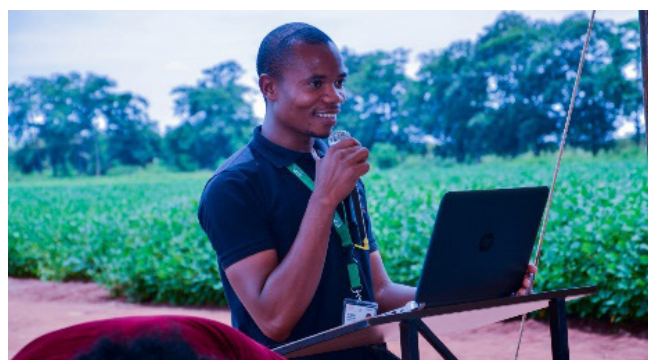
My research and internship were done in Potchefstroom, at the Agriculture Research Council-Grain Crops Institute (ARC-GCI), sorghum breeding department, under the mentorship of Dr. Nemera Shargie. Upon completion of my studies I joined the International Institute of Tropical Agriculture (IITA) as Research Associate based in Malawi.

The key courses which were covered in my first year of study included Genetics, Statistics and Molecular Plant Breeding. These provided an understanding of gene action on inheritance of traits, field evaluation techniques which generate reliable data and statistical procedures thereby accurately interpreting the data. My research focused on characterization of sweet sorghum for biofuel production for both agro-morphological and molecular markers. The study identified five accessions as superior in juice yield. It also identified traits that can be used for both direct and indirect selection for sweet sorghum improvement program.

My work at IITA involves managing soybean breeding trials for Malawi, Chipata (Eastern Zambia) and Mozambique. I work under the leadership of Dr. Godfree Chigeza, who is based in Lusaka, Zambia. I am also coordinating the soybean trials for the Pan African Variety Trials Project (PAVT), a project funded by the USAID, the University of Illinois and the Soybean Innovation Lab (SIL), through the Agricultural Diversification Activity. The project aims at fast tracking introduction, testing and release of soybean varieties thereby providing a wide access of improved soybean varieties to farmers than what is currently available.

This project is done in collaboration with the Department of Agricultural Research Services (DARS), the national research services in Malawi. Through this project we have evaluated materials from seven countries, from Africa and overseas and identified some superior materials which will be due for release soon. We also organize field days where different stakeholders are invited to learn about the soybean materials available and under evaluation.

I have now acquired extensive hands on experience in agricultural research and germplasm maintenance. I am also gaining knowledge on how to successfully run a breeding program. I owe my success to the Alliance for a Green Revolution in Africa (AGRA), for sponsoring my study and research at the University of KwaZulu-Natal, South Africa. Above all, I am grateful to Dr. Julia Sibiya and Dr. Nemera Shargie for the advisory role throughout the study period.



Hands on experience; trial field in Malawi and addressing participants at a field day

07

**Alex Yeboah – Kwame Nkrumah University of Science & Technology Alumni
From Ghana**



After the completion of the Master of Philosophy in Plant Breeding sponsored by AGRA at KNUST in November, 2018 and a successful graduation in February, 2019, I was employed by the CSIR-Savanna Agricultural Research Institute in Nyankpala in the Northern Region in March, 2019 as a Principal Technologist to assist the Rice Improvement Program division.

My duties are to assist the lead Breeder in cultivar development, assist in producing high quality breeder and foundation seeds, establish rice trials, record data, analyze data, writing of reports as well as assisting BSc and MPhil students in carrying out their research works at the division.

The knowledge and skills I acquired during my MPhil. studies enabled me play a huge and significant role as part of the team that proposed to the National Variety Release and Registration Committee of the Ministry of Food and Agriculture of Ghana for the release of six rice genotypes developed by the CSIR-Savanna Agricultural Research Institute on November, 2019. All the six rice genotypes were accepted for release. More so, I am a co-author in the research article 'Evaluation of Yield, Reaction to Diseases, and Grain Physical Attributes of Some Introduced Rice Hybrids in Ghana. International Journal of Agronomy Volume 2019. <https://doi.org/10.1155/2019/3926765>.' (Abebrese et al, 2019).

I am much grateful to AGRA for sponsoring my studies and KNUST for training and mentoring me through my studies.



08

**Kassim Yussif Baba – Kwame Nkrumah University of Science and Technology
From Ghana**



My name is Kassim Yussif Baba from Ghana. I got enrolled into the IMCDA program in 2015 and graduated in 2017 with my internship ending in February 2018. I am currently working at CSIR-Savanna Agricultural Research Institute, as a Principal Technologist (Assistant Research Scientist, Plant Breeding) under the Groundnut Improvement Programme. The training set me on a path to an exciting career through the well-structured curricula, particularly the E-Learning modules.

My research activities are well organized as I design all hybridizations and experiments in BMS, export field book and capture data electronically. By this I can reduce errors in data due to human mistakes compared to the initial paper-based data collection I was doing prior to the training. I am also an R statistical programmer. The training I had from the IMCDA program has also made me understand in detail the basic principles of genetics, molecular and conventional plant breeding, mathematics, cultivar development and cultivar placement. As a result, I am now more effective at work and other professional forums than before.



Kassim Yussif Baba at graduation and in his groundnut fields in Tamale.

09

**Afua Gyaama Gyimah- Kwame Nkrumah University of Science and Technology Alumni
From Ghana**



My name is Afua Gyaama Gyimah. I was awarded the AGRA-IMCDA Scholarship in August 2016 to pursue a Master of Philosophy program in Plant Breeding at KNUST, Ghana. I successfully graduated in July, 2019. I was a Principal Technical Officer at CRI before my undergraduate degree and got interested in pursuing plant breeding after attending the short-term technician training at IITA in Ibadan, also funded by AGRA. On completion of my MPhil qualification at KNUST I was upgraded to Principal Technologist at CSIR- Crops Research Institute. I work with Legumes and Oil Seeds Division specifically the groundnut improvement program. The knowledge gained has improved my efficiency as a plant breeding technologist. I am much grateful to AGRA-IMCDA for their sponsorship and to KNUST for the education and mentoring.



10

**Idris Ishola Adejumobi - Kwame Nkrumah University of Science and Technology Alumni
From Nigeria**



My name is Idris Ishola Adejumobi from Nigeria. I got enrolled into the IMCDA program in the year 2014 and graduated in 2016. I commenced the internship immediately after graduation and completed in the year 2017. I joined the yam improvement program of the International Institute of Tropical Agriculture, Ibadan, Nigeria as a Research Supervisor in 2017. While still working, I started my doctoral research program in 2019 at the University of Kisangani, Democratic Republic of Congo under the MOUNAF Project.

My research focus is on yam genetic diversity in DR Congo using genomic sequencing and the implication for genetic resources management in Central-Africa. The training from IMCDA program has been of great help in my research career. Aside from helping me to secure a good job in a crop improvement research institute, the knowledge from the various e-learning modules are still very helpful in my current doctoral program. Combining this knowledge with acquired skills from my work experience gives me a huge confidence of going through my current research without much challenges.



Idris at IITA Ibadan where he works and in the field

11

Ibrahim Dembele - Kwame Nkrumah University of Science and Technology Alumni From Mali

I am Ibrahim DEMBELE from Mali. I was sponsored by the IMCDA program from 2014 to 2017 in KNUST / Ghana. After completing my master's program I went back to being a research assistant at the Institute of Rural Economy (IER) as a member of vegetable program at CRRRA in Sotuba From 2018 to the present day I am working on the Pan African Bean Research Alliance (PABRA) / West and Central Africa Bean Research Network (W(WE)CABREN). The courses, both physical and e-modules in plant breeding I learned at KNUST, continue to be relevant to the work I am doing. The internship at the CRI gave me a broad base of breeding different crops.

Besides, I also started my PhD on ARTEMISIA in Mali this year.

12

Netsanet Abera – Makerere University Alumni From Ethiopia

My name is Netsanet Abera. I joined Makerere University for my MSc in Plant Breeding and Seed Systems in 2014. I was seconded by my home institution, the Ethiopian Institute of Agricultural Research, Pawe Agricultural Research Centre. Upon completion, I was promoted to be an Associate Research Officer at the Pawe Center. My new main responsibilities are developing varieties, monitoring and evaluation of all the research activities. I am very proud that recently, I released my first finger millet variety with an average yield of 2.8T/ha that is resistant to both leaf and head blast. The variety has a potential yield up to 3.8t/ha in some environments. Besides, finger millet, I also work on sorghum.

The support through AGRA and Makerere University made me who I am today. I am very grateful to all who helped me through this journey.



Netsanet in his finger millet and sorghum fields in Ethiopia

13

Roy Wanjala Namasaka – Makerere University Alumni From Kenya

I am very grateful for the opportunity offered to me to study for an MSc in Plant Breeding and Seed Systems in Makerere University. The scholarship through AGRA was a God sent! This has led me on a great career path. I have gained knowledge and skills that are applicable in the seed industry.

Part of this training was a great internship experience which linked me up with Agri Seed Co Limited, one of the largest seed companies in Kenya and Africa. Now I am a rice breeder in the same company – they employed me after completion of my studies. Recently, after two years, I have been assigned a leadership role as the lead Quality Assurance Officer. This new role has allowed me to interact with various departments from sales, production, research and development and processing. To say the role is exciting would be an understatement. It provides a great opportunity to apply all the breeding and seed technology lessons I learnt from Makerere University while allowing room to constantly learn from the various teams in the different departments.

I would like to thank my mentors at Makerere University, most specifically Dr. Edema and Prof. Gibson who gave me constant guidance. I would say that is the strength of this program. No one walks the path alone and you can always count on those who guided you through the education path to guide you in your career too. In that, I am glad and always grateful I went through this great program and I would recommend it to others too.



Roy (middle) during two-line rice hybrids parent selection exercise at Malindi Station (November 2018) and Roy (far left) with the Seed Co Kenya Research and Development team during July 2020 crop audit in Kitale

14

Oriba Alice - Makerere University Alumni From Uganda

Studying under AGRA scholarship was a life changing opportunity. Having a great team of technocrats, mentors, fathers and friends like Dr. Richard Edema, Prof Paul Gibson, Mama Pauline and Candia Alice was a gift that had enormous impact in my life.

Since the completion of the MSc in Plant Breeding and Seed Systems, I have gained profound expertise that is currently applied in my job as Team Leader Agricultural Extension Supervisor. I work for Northern Uganda Resilient Initiative (NURI) that covers the whole of Northern Uganda ranging from West Nile region, North Western region and Acholi sub-region.

Currently, NURI is the biggest DANIDA funded program in Uganda. With the outstanding knowledge, skills and experience I gained in Plant Breeding and Seed Systems, I have been assigned the role of a team leader in charge of 40 staff in the West Nile region. This has given me an opportunity to experiment all the breeding knowledge and principles of seed technology and multiplication leading to increased food security and household income of our farmers.

I am always grateful for the guidance, mentorship, advice and encouragement received from the Makerere University AGRA team ensuring that all worked well for the good of the program and the students. Much as we are gone, the legacy of that AGRA program will continue, and I will always recommend it for people who have the zeal in Plant Breeding.

I am very proud that through AGRA-IMCDA, MaRCCI was borne and is excelling in the capacity building of plant breeders in the Sub-Saharan region.



Alice in the corner of the field during first season roll out of NURI Program monitoring in the project area of Vura. In the next picture, Alice is in the middle of the field during field inspection of the seed multiplication field.

