



IITA
Transforming African Agriculture



IARSAF 26TH ANNUAL SYMPOSIUM

Theme: “Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security”

Book of Abstracts

for the 26th Annual Symposium
of the International Association
of Research Scholars and Fellows

27 – 30 November, 2023



**BOOK OF ABSTRACTS FOR THE 26TH ANNUAL SYMPOSIUM OF THE
INTERNATIONAL ASSOCIATION OF RESEARCH SCHOLARS AND FELLOWS,
IITA, IBADAN, NIGERIA**



International Institute of Tropical Agriculture – www.iita.org.

DELIVERING INNOVATIVE RESEARCH TOWARDS INCLUSIVE ADOPTION OF CLIMATE-SMART AGRICULTURE FOR FOOD AND NUTRITIONAL SECURITY

Book of Abstracts for the 26th Annual Symposium of the International Association of Research Scholars and Fellows

Hybrid (Conference Centre, IITA Ibadan, & Zoom), 27th – 30th November, 2023.

Compiled by:

Akpojotor U. L., Olaoye O. D., and Adebisi A. O.



CGIAR

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FOREWORD

The food and agricultural systems around the world are becoming more and more susceptible to the worsening effects of climate change. It is crucial to develop solutions that minimize agriculture's contribution to greenhouse gas emissions while increasing its resilience to extreme weather events and climate change. Climate-smart agriculture (CSA) is a strategy for guiding the actions required to reform and reorient agricultural systems to successfully promote development and assure food security in a changing climate. It facilitates the identification of production systems that are appropriate for mitigation and, when feasible, adaptation, allowing institutions to expand their response to address the problems posed by climate change in particular regions.

The 26th annual symposium of the International Association of Research Scholars and Fellows (IARSAF) provides a platform for different stakeholders and policymakers involved in the food system to make relevant recommendations that ensure sufficient food sovereignty worldwide. This book of abstracts provides a range of climate-smart practices and innovations that have been proven to be effective based on solid evidence and provide an enabling environment that includes conducive policies, institutions, and finance.

I call upon all the participants to embrace this discussion holistically and exhaustively to contribute to the existing knowledge of agriculture production in such a fragile ecosystem and contribute towards a food-secure world.

On behalf of IARSAF, I extend deep gratitude to all the participants and sponsors of this noble event for making this year's symposium a success.

TABLE OF CONTENTS

ITEM	PAGE
Foreword	v
Table of Contents	vi
Editorial Crew	vii
Editor's Note	viii
Preface	ix
President's Welcome Address	x
Profiles of Keynote Speakers and Lead Presenters	12
Oral/Poster Presentations	24
Crop Production and Plant Breeding	25
Crop Biotechnology and Genetic Improvement	40
Food Science and Nutrition	46
Plant Health and Entomology	54
Agri-economic, Business and Extension	59
Annex 1	73
Annex 2	74
Annex 3	86
Annex 4	87
Annex 5	90
About IITA Bioscience Center	92
About IITA Genetic Resource Center	94
Inqaba Biotec	95

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EDITOR'S NOTE

It is with great pleasure and excitement that I present to you the compilation of abstracts featured in this book. As the editor-in-chief of the International Association of Research Fellows and Scholars, I have had the privilege of gathering a diverse collection of abstracts that capture the breadth and depth of research and scholarly contributions from Natural Resource Management, Crop Production and Plant Breeding, Plant Health and Entomology, Biotechnology and Genetic Improvement, Agri-Economic, Business and Extension, Agricultural mechanization and Agri-tech and Food and Nutrition Science.

This book of abstracts serves as a demonstration of the dedication and intellectual prowess of the contributors, who have shared their innovative ideas, research, and insightful perspectives. The diverse range of abstracts submitted for this event reflects the multifaceted nature of climate-smart agriculture and also its contribution as part of the solution to climate change.

The 26th annual symposium, with the theme “Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security” explores the realistic steps in delivering solution-based research and the inclusive adoption of this research by farmers of both genders to improve food and nutritional security in Africa. The theme was selected to draw attention to the adoption of climate-smart techniques to sustain the food system and meet the SDG goal of zero hunger.

As we embark on this event, we hope that this compilation will serve as a source of inspiration for researchers, scholars, and enthusiasts alike, encouraging further exploration and collaboration. Together, we have the potential to drive real-world change and make strides toward a future where climate-smart agriculture is not only adopted widely but also inclusively, ensuring food and nutritional security for all.

We invite you to engage wholeheartedly with the discussions, share your perspectives, and be inspired by the wealth of knowledge that will be presented.

We would like to express our gratitude to all the authors who have entrusted us with their work. Your commitment to advancing knowledge and fostering intellectual discourse is evident in the quality and diversity of the abstracts presented in this volume.

We extend our sincere appreciation to the reviewers who dedicated their time and expertise to ensuring the scholarly rigor and excellence of the abstracts. Your valuable insights have played a crucial role in shaping this compilation.

Also, to my colleagues in the editorial team, I appreciate the effort and time you put into making this book of abstracts a reality.

To the readers, we invite you to immerse yourselves in the richness of the ideas presented within these pages. May this book of abstracts ignite ideas, collaborations, and partnerships.

We hope you find this compilation both enlightening and inspiring.

Akpojotor Ufuoma

Editor-in-Chief, 2023

PREFACE

Dear esteemed scholars, it is a genuine pleasure to extend a warm welcome to all the new participants, as well as our continuing students, scientists, and valued partners, to the 26th IARSAF Annual Symposium. In a season where numerous conferences vie for attention with tight budgets and schedules, your choice to be a part of this event is truly commendable. Your commitment is evident in the numerous abstracts we have received, reflecting your dedication to attending this symposium, either in person or virtually.

This year's symposium promises to be a captivating experience set amidst the breathtaking and scenic surroundings of the International Institute of Tropical Agriculture (IITA) Headquarters in Ibadan. Beyond the rich learning opportunities provided by students and scientists, we are eager to share not only knowledge but also to relish the fresh air in a serene and green atmosphere.

The theme for this year's symposium, "**Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security**," is both timely and crucial. In the face of climate change and extreme weather events impacting agricultural production significantly, Climate-Smart Agriculture (CSA) emerges as a vital approach to reduce greenhouse gas emissions, build climate resilience, and ensure increased agricultural productivity, thereby enhancing food and nutrition security.

Participants from research institutions, academia, and industry will have the opportunity to showcase technologies and research outputs aimed at advancing climate-smart agriculture. Active participation, a hallmark of IARSAF symposiums, remains crucial, and through our collaborative efforts, we can chart a course towards a food ecosystem that is not only nourishing and secure but also sustainable for generations to come.

I extend my sincere gratitude to the management and staff members whose tireless contributions have been instrumental in the success of this symposium. Special thanks to D.G., Dr. Simon Ehui, Dr. Bernard Vanlauwe, DDG, Research for Development (R4D), Dr. Kenton Dashiel, DDG Partnership for Delivery, Ms. Sore Zaina, Head Capacity Development Office, Mrs. Mary Badejo, Ms. Linda Barasa (Kenya), and Prof. Danny Coyne (Kenya).

Congratulations and a heartfelt thank you to all IARSAF members for your invaluable contributions and cooperation towards the success of this noble cause. Together we stand, and divided we fall. May the Grace of the Lord be upon your lives today and forever more!

Celestine Anyango Oduori

Vice President, IARSAF 2023

DELIVERING INNOVATIVE RESEARCH TOWARDS INCLUSIVE ADOPTION OF CLIMATE-SMART AGRICULTURE FOR FOOD AND NUTRITIONAL SECURITY

It is my profound honor to welcome you to this year's 26th annual symposium of IARSAF on behalf of the International Association of Research Scholars and Fellows (IARSAF). This year's symposium emphasizes **“Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security”**. This theme is very pertinent, as we are confronted with unprecedented and multiple challenges in the agriculture sector. Inclusivity is the practice of providing equal access to opportunities and reassurance for people who might be excluded or marginalized due to physical or intellectual disabilities or belonging to other minority groups. There is a need for us to create the mindset of thriving together and not just surviving alone by creating peaceful, resilient, inclusive, and sustainable opportunities for everyone to strive for, as we cannot continue to live on fragmentation.

IARSAF is a conglomerate of graduate students from various universities and countries who are currently undertaking their M.Sc. and PhD. fieldwork at IITA in the field of agriculture and other related disciplines. IARSAF activities have contributed to the overall goal of IITA. It is evident that the desired modifications in Africa's agricultural development can be achieved through collaborative efforts with agencies, institutes, ministries, non-government agencies, civil society, and researchers.

Our generation has been confronted by too many existential problems. With the unrest between Ukraine/Russia (Europe) and Israel/Palestine (Asia), the COVID era, extreme poverty, and the problem of climate change, Africa cannot continue to depend on free grains to feed its population. This platform aims to explore cutting edge research and technologies for solving the limitations of food security and climate resilience through inclusivity. It also aims at finding solutions that are accessible and beneficial to a wide range of stakeholders by using our pathways to solve the food security issue, as there is no single model to follow. It typically involves sustainable and adaptive approaches that minimize environmental impact and help farmers. Interestingly, this symposium will address issues relating to inclusivity and building an ecosystem of research among institutes on a global scale. There is a need for the agricultural architecture to provide a safety net and create pathways for our food system.

In summary, this meeting should be a solution statement that will convey a commitment to conduct forward-looking research in agriculture with a focus on adapting to climate change, making these adaptations inclusive, and ensuring that they contribute to food and nutritional security. We need to rise up to the challenges of sustainable food production for the growing global population.

I have a great honor to express my profound gratitude to IITA management for their overwhelming support for this symposium. We sincerely appreciate our D.G., Dr. Simeon Ehui, and his deputies P4D and R4D, respectively, Dr. Kenton Dashiell and Dr. Bernard Vanlauewe, for their investment in science by empowering research fellows with the required skills to excel. We also express our gratitude to the Director, West Africa Hub, Prof. Michael

Abberton, for his unrelenting efforts toward us. Worthy of appreciation are the Head of Capacity Building, Mrs. Zaina Sore, and our boss and coordinator of graduate studies, Mrs. Mary Badejo. Finally, I thank IARSAF executives, IARSAF members, the editorial team, our guests, and all our sponsors for the successful hosting of this event. Thank you, and have a good conference.

Olukunle, Babatunde Bashir

IARSAF President, 2023

PROFILES OF KEYNOTE SPEAKERS



Dr Swati Nayak,

Scientist & South Asia Lead
Seed Systems and Product
Management
International Rice Research Institute

Dr. Swati Nayak is a distinguished scientist affiliated with the CGIAR International Rice Research Institute (IRRI). She holds the prestigious title of the 2023 Borlaug Field Award recipient from the World Food Prize Foundation. Dr. Nayak presently serves as the South Asia Lead for Seed Systems at IRRI and also holds the global leadership position for cereal seed systems within the CGIAR initiative known as Seed Equal. Within her role, Dr. Nayak is an integral part of IRRI's Rice Breeding Innovation Platform, specializing in the promotion and scaling of various promising climate-resilient, high-yielding, and nutrition-rich crop varieties and germplasm across diverse market segments. Her approach is aligned with the preferences of farmers, the demands of value chain stakeholders, and consumer needs. She is dedicated to ensuring the genetic gain of potential varieties in farmers' fields and facilitating the development of seed markets to ensure the availability of high-quality seeds of desired crop varieties to farmers across locations. Through her diligent strategic efforts, partnerships, and innovative positioning models, she has

successfully introduced numerous climate-resilient rice varieties in South Asia, thereby contributing towards sustainable agriculture.

Dr. Nayak has an extensive professional background in steering programs that focus on Scaling Innovations, Delivery systems, Technology Transfer, and extensive public-public-private partnership strategies that focus on accelerating the impact and scale of agriculture technologies. According to her, with the availability of innovative agricultural technologies, it is important to establish efficient delivery systems. Furthermore, Dr. Nayak has experience in engaging women and communities in technology scaling initiatives and program targeting. In the process, she trained numerous women groups in South Asia in varietal selection, seed production, marketing, and business development. She has contributed to the establishment of numerous seed production businesses led by women and smallholder farmers.

Dr. Nayak's educational journey includes a Ph.D. in Competitive Intelligence for Agricultural Extension Management Strategy, a Master's degree in Rural Management from the Institute of Rural Management and a Bachelor of Science in Agriculture.



Dr. Godwin Atser

Country Director
Sasakawa Africa Association (SAA)
Nigeria

Dr. Godwin Atser is the Country Director of Sasakawa Africa Association (SAA) Nigeria. He has a PhD in Agricultural Extension & Rural Development from the University of Ibadan, an MSc in Agricultural Extension & Rural Development from the University of Ibadan, and a BSc in Agricultural Economics & Extension from the University of Agriculture Makurdi.

Prior to joining SAA, Dr Atser worked with the International Institute of Tropical Agriculture (IITA) on several projects funded by donors such as the African Development Bank (AfDB), International Fund for Agricultural Development (IFAD), World Food Program (WFP) and the Bill & Melinda Gates Foundation. He was the Project Manager for the GIZ/GIAE Cassava & Maize Value Chain Project; and Advocacy, Promotion & Outreach Lead for the Building an Economically Sustainable, Integrated Cassava Seed System, Phase 2 (BASICS-II) at IITA.

During his stay at IITA, Dr Atser developed an extension toolkit known as the Six Steps to Cassava Weed Management—a set of recommendations that helps farmers to control weeds in cassava but also maize. The toolkit helped farmers to more than double their yields while at the same time reducing the drudgery associated with weeding. He also led the team that developed a digital app on pesticides application known as IITA Herbicides Calculator in attempt to control the misuse of herbicides among farmers in sub-Saharan Africa.

Dr Atser served as the Team Leader for GIZ for the Review of Extension Manuals for cassava, maize and potatoes. He was the Digital Extension & Advisory Services Specialist with the African Cassava Agronomy Initiative (ACAI) project; and the Communication & Knowledge Exchange Expert with the Cassava Weed Management Project (CWMP), all in IITA. Dr Atser is skilful in digital extension, proposal development, advocacy, training, development communications, knowledge management, resource mobilization, marketing and public affairs/media relations. He has authored several articles in peer reviewed journals.



Prof. Aremu, Charity Onye

Former Vice-Chancellor,
Director, African Agripreneurship
Development Centre,
Landmark University,
Omu-Aran, Kwara, state

Charity Aremu is a professional university teacher and administrator, with over two (2) decades of quantifiable and successful experience in teaching, research and service impact. A Professor of Agriculture (Genetics and Plant Breeding under climate changes) and teacher, born five decades ago.

She is a resource person on driving United Nations Sustainable Development Goals (UNSDGs). She has been involved in National and International projects including National Center for Agricultural Mechanization/Landmark University rice project, Bill and Melinda Gate CAVA 11/FUNAAB project on Cassava production and impact on rural pro-poor farmers; Federal Ministry of Agriculture and Rural Development/West African Virus Epidemiology for Food Security (WAVE) project. Some of these projects received awards and financial profiting for her university.

Her research efforts culminated into developing drought resistant cowpea genotypes for the savanna ecologies. She was one of the researchers that enjoyed AGRA grant in 2013 to develop drought tolerant maize genotypes for the savanna ecology. During her University days at the University of Ibadan, charity was the best graduating student and enjoyed Shell Pb award and Zartech farms best scholar award. As a researcher, her niche spans to Agro-ecological factors affecting Genotype by Environment interaction (GXE) for quality and stable yield in legumes and grains. She is widely published as an avid researcher. Her publications span to a minimum of one hundred (100) articles in Scopus, web of Science and other national and international publishing domains. Her citations in Google Scholar is well above 1,000.

Charity received her educational trainings from the University of Ibadan and University of Agriculture, Abeokuta (Ph.D) Nigeria for the first, second and Ph.D degrees in Agriculture and climate actions. In addition, she has certificates in computer soft skills, data management and administrative leadership. She has a touch of horticultural training from Wilo Farms, Fresno, California, in 2019.

In academic administration, Charity through privilege of service has held and still holds leadership positions such as Head of Department and College Deans of Agriculture and Dean, School of Postgraduate Studies, spanning a minimum of three years on each. Prof. Aremu was the Vice-Chancellor of Landmark University up until 31st Aug., 2023 and now, the Director, African Agripreneurship Development Centre (AADC), of same university. She is an astute academia and administrator with proofs of building capacities among the youth and upcoming generation.

Prof Aremu Charity glees on musicals, cycling and long walk to relax and refresh and she is blessed with God's gift of children and loving family.



Dr. Olajumoke Adeyeye

Postdoctoral Fellow (Gender Research)
International Institute of Tropical Agriculture, Ibadan

Olajumoke Adeyeye joined IITA on November 1st 2022 as a Postdoctoral Fellow (Gender Research). She is based at IITA, Ibadan. Her research focus is on micro-level analysis of multidimensional empowerment, gender, and youth empowerment, especially in agriculture and rural livelihoods. She has a doctoral degree in Agricultural Extension and Rural Development from the Federal University of Agriculture, Abeokuta, Nigeria in 2018. Before taking up the Postdoctoral position, Olajumoke worked as a Senior Research Fellow at the Centre for Gender and Social Policy Studies, Obafemi Awolowo University, Ile-Ife, Nigeria where her responsibility included teaching, research, and advocacy on gender, development and social policy issues.

Olajumoke has vast experience in conducting research having led and worked with multidisciplinary team on projects funded by IDRC, BMGF, etc. in different contexts across Africa: Nigeria, Ghana, and Tanzania. She has hands-on experience on gender analysis, mainstreaming and integration; gender policy design, implementation and review; and women empowerment and Gender Analysis frameworks. She is a recipient of different fellowships and grants including the African Women in Agriculture Research and Development (AWARD) Fellowship (2011), INASP AuthorAid Gender Workshop Grant (2015), and IITA Graduate Research Fellowship (2016). She has published in reputable academic outlets as well as attended and facilitated conferences, seminars and webinars, locally and internationally.



Atanda Samuel Oladejo

Senior lecturer, Department of Crop Production and Protection, Obafemi Awolowo University

Dr Atanda S. Oladejo is a researcher and lecturer in the Department of Crop Production and Protection, Obafemi Awolowo University, Ile-Ife, Nigeria; and a former research fellow at the International Institute of Tropical Agriculture (IITA), Ibadan – Nigeria, where he served as the IARSAF general secretary for two sessions 2013/2014 and 2014/2015. He has over ten years of research experience in Africa countries, India, and United States. His career goal is to solve problems militating against food and nutrition security via cutting-edge research in plant breeding and genetics.

He is an awardee of Nuffic Fellowship, Wageningen University, the Netherlands on plant genetic resources and seeds held in Chennai and Jaipur, India, 2014; and a visiting scientist at Utah State University, Logan, UT-84320, United States, 2022. He is the Principal Investigator of the USAID Feed the Future Innovation Lab, the **University of California Davis**, United States project in Nigeria on 'Engaging youths on the

production of indigenous fruits and vegetables in Nigeria.

He is also the principal investigator of the Crop Trust, Bonn, Germany-funded project on Biodiversity for Opportunities, Livelihood and Development (BOLD) on the duplicate regeneration of local legumes and indigenous vegetables in Nigeria: project targeting conservation of genetic diversity of food legumes tailored achieving food and nutrition security. Dr Oladejo holds PhD (Plant Breeding Genetics) from Obafemi Awolowo University, Ile-Ife, Nigeria, and he has published many research reports and academic journal articles.



Dr. Melaku Gedil

Head, IITA Bioscience Center
Molecular Geneticist/Molecular
Breeder
International Institute of Tropical
Agriculture

Melaku Gedil is the Head of Bioscience Center and Molecular geneticist/molecular breeder at the International Institute of Tropical Agriculture (IITA), Nigeria. He obtained his first degree (Plant Sciences Nov 1985. Addis Abeba University, Ethiopia) and second degree (Agronomy Aug 1993 Alemaya University of Agriculture, Ethiopia) in plant breeding. His PhD thesis project (Oregon State University USA 1999) focused on molecular biology (linkage mapping, candidate resistance gene, diversity analysis). Later, he earned MSc in biotechnology/bioinformatics to enhance his computational skill for application in molecular breeding.

His experience, therefore, encompasses a wide range of state-of-the-art molecular biology lab techniques as well as bioinformatics. He has about a decade of work experience in application of molecular marker to improvement of crops. He hopes to draw on his background in plant breeding, statistical genetics, molecular biology, and bioinformatics as a foundation for studying and applying functional genomics techniques to develop an efficient and effective molecular breeding program mainly for cassava and maize but also for soybean, cowpea, and yam. He is particularly interested in introducing cost-effective and high throughput genotyping techniques that are feasible in developing countries.

Dr. Gedil, in collaboration with colleagues, is pursuing various approaches towards this goal including development of molecular markers associated with disease resistance, quality traits, abiotic stress, and other desirable agronomic and specialty traits. Among the approaches are marker-assisted recurrent selection (MARS), genome wide association study (GWAS), genome selection, linkage/QTL mapping, comparative genomics and functional annotation of genes. In the newly upgraded Bioscience Center at IITA, he is leading the establishment of a nascent bioinformatics unit. One of the strategies of the unit is to partner with advanced labs for remote access to high performance computational facilities and cloud computing.



Dr. Awoyale Wasiu

Senior Lecturer, Department of Food Science and Technology, Kwara State University, Malete, Nigeria

Awoyale Wasiu graduated from the University of Agriculture, Abeokuta, with a Bachelor of Science degree (Honours); Second Class Upper Division in the Department of Food Science & Technology in 2004. He obtained a Master and Doctor of Philosophy (Ph.D.) Degrees at the Department of Food Science & Technology (Specializing in Food Processing & Storage Technology), the Federal University of Agriculture Abeokuta in June 2010 and October 2014, respectively.

He joined the services of Kwara State University in 2013 as an academic staff. He has supervised more than sixty (60) undergraduate students in the Department of Food Science & Technology, Kwara State University Malete, and in collaboration with colleagues at the International Institute of Tropical Agriculture (IITA), Ibadan, he has supervised Master of Science (M.Sc.) and Doctor of Philosophy (Ph.D.) students/graduates. Awoyale has published over 80

articles including technical peer-reviewed Journals, Books of Proceedings, and Book Chapters.

From 2007 to 2009, Awoyale productively worked on the possibility of incorporating distillers' spent grains in maize flour to produce a local maize-based snack (Kokoro) as a Research Fellow in the then Crop Utilization Unit (now Food & Nutrition Science Laboratory) of IITA. The experience as a Research Fellow assisted his participation in other IITA implemented projects. Awoyale was the Assistant General Secretary of the International Association of Research Scholars and Fellows (IARSAF) during his Fellowship with the institute.

With his interpersonal, dynamic nature, and technical skills, Awoyale participated in the multi-disciplinary IITA Common Funds for Commodities (CFC) project with funds from The Netherlands, in collaboration with the Federal Ministry of Commerce & Industry (now Trade & Investment), Abuja, Nigeria. During this period (2010-2012), he displayed a high level of commitment in the upgrading of a cassava processing factory based in Masaka, Nasarawa State, in the production and branding of high-quality fufu powder and gari from cassava roots and registration with the National Agency for Food & Drug Administration & Control (NAFDAC).

Between 2014 and 2016, Awoyale worked as a Postharvest Consultant in the High-Quality Cassava Flour (HQCF) Value Chain Project funded by the International Funds for Agricultural Development (IFAD) in collaboration with different value chain actors, where the beneficiaries were trained on standard operating procedures, good manufacturing practices and the hazard analysis and critical control points involved in the production of HQCF, and market linkage.

Within the same period (2014-2018), Awoyale worked as a partner in the IITA-Globe BiomassWeb project, co-supervising graduate (MSc and Ph.D.) students from Universities within Nigeria. Awoyale successfully served as a Visiting Scientist/ Cassava Value Chain Specialist in the Smallholder Agricultural Productivity Enhancement and Commercialization (SAPEC) Project, funded by the Africa Development Bank (AfDB) and the Global Agriculture and Food Security Program (GAFSP) of the World Bank, and implemented by IITA in collaboration with the Liberia Ministry of Agriculture.

During this period (2016-2018), Awoyale established six fully equipped cassava processing centers, trained the beneficiaries/factory staff on the use of the installed machines, and the standard operating procedures, good manufacturing practices, and the hazard analysis and critical control points involved in the production of HQCF, fufu flour and gari among others, thus, upgrading cassava processing machines and products in Liberia. From 2019 to 2020, Awoyale was a Postharvest Consultant of the African Development Bank (AfDB) funded Technologies for African Agricultural Transformation (TAAT). From 2020 to December 2022, Awoyale was a Postharvest Consultant with the Next Generation (NextGen) Cassava Project funded by the Bill and Melinda Gates Foundation and the Department for International Development of the United Kingdom. The assessment of the suitability of different NextGen cassava varieties for gari and fufu flour production was carried out in the project.

Awoyale has attended different national, regional, and international conferences/workshops on Training-of-Trainers, product development, value addition, and value chain development, among others. He is highly dynamic and grassroots oriented. His networking ability has facilitated a positive working relationship with non-governmental and government partners. He commands excellent language skills.



Fowobaje Kayode

Biometricians, IITA

Kayode Fowobaje is an experienced Biometrician with progressive experience at the International Institute of Tropical Agriculture (IITA) HQ, Ibadan, Nigeria, where he contributed to analyzing large multi-year and multi-location trials data generated in different projects/programs, enhancing the quality, usefulness, and availability of agricultural innovations to meet Africa's most pressing challenges of hunger, malnutrition, poverty and natural resources degradation for the benefit of small-holder farmers in Sub-Saharan Africa. Kayode is a well-published researcher with publications in reputable journals spanning diverse fields.



Dr. Lava Kumar

Head, Germplasm Health and Virology and Diagnostics, IITA, Ibadan, Nigeria

Dr. Lava Kumar is the Head of the Germplasm Health and Virology and Diagnostics at the International Institute of Tropical Agriculture (IITA) in Ibadan, Nigeria. His program involves the characterization of viruses, diagnosis, and control of virus diseases of important food and horticultural crops in sub-Saharan Africa. He coordinates the ALLIANCE for Banana Bunchy Top Disease Control in Africa and the CGIAR Germplasm Health component of the Genebank Initiative. His program developed several innovative approaches for virus disease diagnosis and control, strengthening phytosanitary systems with a specific emphasis on preventing and managing the transboundary spread of pests and pathogens and ICT-based applications for disease surveillance and seed quality assurance.

He obtained his Ph.D. in Virology in 2000 from Sri Venkateswara University, Tirupati, India, and has authored/co-authored over 140 research articles in peer-reviewed journals and guided several MSc and PhD students. He is a recipient of several merit awards, including the CGIAR Young Scientist Award in 2001 and the IITA Best Scientist Award in 2018. He serves on several international panels, including Africa Union Inter-African Phytosanitary Council and International Plant Virus Epidemiology Committee.



Rev. (Professor) Janice Olawoye
Professor of Rural Sociology,
Proprietor of King's International
College

Janice Olawoye was born on the 24th of February, 1951 at Hartley, Iowa, USA. She had her primary and secondary education in Iowa and later went on to Iowa State University for her Bachelor's and Master's degrees in Sociology in 1972 and 1976 respectively. She obtained her Ph.D. in Sociology from the University of Ibadan in 1986.

Janice Olawoye became a Professor of Rural Sociology in 1998 at the Department of Agricultural Extension and Rural Development, University of Ibadan, where she taught for 38 years until voluntarily retiring in 2016. She served the University in various administrative and committee capacities including Head of Department for seven years as well as being elected the first female Dean of the Faculty of Agriculture and Forestry (2004-2006). She was a member of the University Appointments & Promotion Committee and the Anti-corruption and transparency Committee as well as the Chairperson of the Senate Truth Committee. She has served as Hall Mistress of Queen Elizabeth II Hall and a Coordinator at the Centre for Sustainable Development (CESDEV).

With extensive teaching and research experience, Professor Olawoye has developed expertise in social issues related to rural development as well as gender issues. She has over 70 professional publications and has carried out well over 60 research assignments for several national and international development organizations including The World Bank, FAO and IFAD. She has supervised many undergraduate and postgraduate students including 30 Ph.D students. Janice Olawoye has served on the boards of several NGOs, including charitable organizations.

Mrs. Olawoye is happily married to Rev. (Dr.) O.O. Olawoye who is the Founder of Faith Bible Church, where she is also an ordained Pastor, specializing in Christian education for children, as well as marriage and family seminars. She has published several Christian books including teaching materials for children's Sunday School. The Olawoyes are the Proprietors of King's International College, King's Junior Academy and King's School of Further Studies at Moniya, Ibadan. The family is blessed with four wonderful sons and so far has six cherished grandchildren.

ORAL/POSTER PRESENTATIONS



Plenary Chairperson: Dr. Atanda Oladejo

Affiliation: Department of Crop production and Protection, Obafemi Awolowo University, Ile-Ife, Osun State

Position: Senior Lecturer and scientist

LIST OF ORAL PRESENTATIONS

- 1. Variability studies for agronomic and anti-nutritional traits in AYB germplasm**
- 2. Assessment of variability in seedling vigour characteristics in fifteen (15) bambara groundnut (*Vigna subterranea* L.) Verdc genotypes**
- 3. Impacts of natural growth regulators on germination rate, growth and development of kola species**
- 4. Intercharacter association and path analysis of yield-related traits in some open-pollinated maize varieties**
- 5. Genetic Analysis of Root Nodulation in Cowpea (*Vigna Unguiculata* [L.] Walp.)**
- 6. The Effects of Different Rates of Pre-Emergence Herbicide on Weed Species Composition, Growth and Yield in Maize/Cassava Intercrop**
- 7. Effects of Intercropping and Integrated Soil Fertility Management on the Growth, Seed Yield and Nitrogen Fixation of Soybean**
- 8. Evaluation of maize (*Zea mays* L.) varieties under low and optimum nitrogen fertilization in Ogbomoso**
- 9. Performance of tomato accessions for yield, quality and adaptability to humid environments**
- 10. Comparison of some winged bean and African yam bean accessions for seed yield**
- 11. Bulking rate of cassava (*Manihot esulenta* crantz) for root yield at different harvest period**

LIST OF POSTER PRESENTATIONS

- 1. Soil baseline of Igbotako and Ode-Aye towns in Okitipupa LGA of Ondo state, Nigeria, to determine efficiency for increased cassava production**
- 2. Potentials of Artificial Intelligence (AI) tools for weed management to achieve high yield of maize (*Zea mays* L.)**

ORAL PRESENTATION

Variability studies for agronomic and anti-nutritional traits in AYB germplasm

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Abstract

African Yam Bean (AYB) is an underutilized legume with enormous potential. It can provide a sustainable solution to malnutrition and food insecurity in Sub-Saharan Africa if carefully explored. Thus, the research was carried out to identify variability among the accessions for agronomic traits and anti-nutritional compositions. Thirty AYB accessions were characterized using a randomized complete block design in three replications. Data were collected on 13 agronomic traits using the IITA Reference Guide. Seeds and tubers of the AYB accessions were evaluated for concentration of anti-nutrients using the Association of Official Analytical Chemists (A.O.A.C) method of analysis. ANOVA and PCA were computed using R-package. Variations were observed in AYB accessions for the agronomic and anti-nutritional traits evaluated. Accession TSs-519 was observed with the earliest days to peduncle initiation (49 days), days to flowering (64 days), highest pod weight per plant (59.64 g), number of seeds per pod (94), and seed weight per pod (28.08 g). The first three PCs accounted for 62% of the total variation observed. Phytate content ranged from 0.87 ± 0.03 (tubers of TSs-130) to 9.05 ± 0.00 mg/g (seeds of TSs-603). Tannin content ranged from 0.42 ± 0.02 (tubers of TSs-130) to 2.57 ± 0.01 mg/g (seeds of TSs-561). Oxalate content ranged from 12.82 ± 0.02 (seeds of TSs-515) to 14.02 ± 0.02 mg/g (tubers of TSs-130) and trypsin inhibitor from 1.99 ± 0.00 to 38.31 ± 0.50 mg/g seeds of TSs-634 TSs-636) respectively. The variation observed for the traits among the accessions evaluated has provided information on the promising traits that could be considered for selection and improvement of AYB genotypes to enhance food security.

Keywords: Genetic variability, agronomic traits, anti-nutrients and food security.

Assessment of variability in seedling vigour characteristics in fifteen (15) bambara groundnut (*Vigna subterranea* (L.) Verdc) genotypes

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Abstract

The understanding of the diversity in seedling vigour characteristics of Bambara germplasm, an indigenous crop with untapped potential, would enhance farmers' decision-making process in selecting seed lots and contribute to the overall improvement of Bambara. Six seedling vigour traits including seedling emergence, Mean Germination Time, Seedling height, seedling weight, and Seedling Vigour Index, were observed on 15 Bambara accessions, sourced from the Genetic Resource Centre of International Institute of Tropical Agriculture Ibadan, Oyo state. The experiment which was carried out at the CEADESE Screenhouse facility of the Federal University of Agriculture, Abeokuta was laid out in a Completely Randomized Design with three replicates. Analysis of variance, Principal Component and Correlation analyses were employed to determine the variability in the population and the association among the six traits. Significant difference ($P < 0.05$) was discovered among the genotypes for characters like seedling length, vigour index and dry weight with Genotype TVSu-1718 recording the best and most consistent performance. The first two principal components accounted for 79.40% of total variation observed, implying a level of variation in the population studied. The study concluded that selection for superior seedling height will improve the seedling vigor index in Bambara groundnut and that considerable variability existed among the genotypes and thereby recommended Genotype TVSu-1718 for commercial cultivation and utilization.

Keywords: Variability, seedling vigour, association, superior genotype

Impacts of natural growth regulators on germination rate, growth and development of kola species

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Abstract

Kolanut is an important medicinal and industrial crop but prolonged dormancy is its major production constraint. The study investigated the effects of natural growth regulators (*Cocos nucifera* L. and *Borassus flabellifer* L.), in breaking seed dormancy of Kolanut. Nuts were raised in germination boxes in the screen house. Water extracts of *C. nucifera* and *B. flabellifer* were sprinkled at two-day intervals for two weeks. Water was used as control. Data were collected on seed germination, seedling vigour, and height. Data were analyzed using Statistical Package for Social Sciences (SPSS) v. 17 and means were separated using LSD at 5% level of significance. Results showed that kolanuts treated with *C. nucifera* extract germinated earlier with mean germination rates of 64%, 53.1% and 44% at 3, 6 and 9 weeks after sowing than others and maintained the highest growth rate, seedling vigour, and heights significantly different from other treatments. The increased germination and growth rate due to *C. nucifera* extract suggests a viable solution to the breaking of dormancy in Kolanut.

Keywords: Kolanut, seed dormancy, natural growth regulators, *Cocos nucifera*, *Borassus flabellife*

Intercharacter Association and Path Analysis of Yield-Related Traits in Some Open-Pollinated Maize Varieties

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Abstract

The improved production of maize remains crucial for food security in Sub-Saharan Africa. Hence, Plant Breeders need to prioritize the improvement of open-pollinated maize varieties (OPVs), which represent a significant proportion of the maize seed system in the region. This study was carried out to determine the relationship and contribution of eight yield-related characters of 20 OPVs collected from the germplasm of the International Institute of Tropical Agriculture to grain yield. The study, laid out in a Randomized Complete Block Design with three replicates, was conducted at the Teaching and Research Farm, Federal University of Agriculture, Abeokuta. Data collected on the yield-related characters were subjected to Analysis of Variance and Duncan Multiple Range Test, at a 5% significance level. Pearson correlation and path coefficient analyses were also computed to assess the relationship between the characters. Significant differences ($P < 0.05$) were revealed for characters like ear height, grain weight, 1000-seed weight, and grain yield. Grain yield recorded a highly significant and positive association with grain weight (0.88), ear-height (0.58) and plant height (0.37). From the path analysis, the results indicated that grain weight (0.92), ear height (0.23), days to silking (0.06), and field weight (0.05) had direct positive effects on grain yield, while plant height (-0.18), 1000-seed weight (-0.08), and days to tasseling (-0.05) had direct negative effect. The study found that selecting for grain yield in maize OPVs can be improved by focusing on grain weight and thereby recommended that OPV maize yield improvement programmes prioritize the selection for grain weight and ear height.

Keywords: Relationship, improvement, open-pollinated, yield

Genetic analysis of root nodulation in cowpea (*Vigna unguiculata* [L.] Walp.)

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Abstract

Cowpea (*Vigna unguiculata* (L.) Walp.) is a grain legume of high agronomic, nutritional and economic importance in the semi-arid tropics where it is mainly cultivated by small holder farmers. Nodulation in cowpea helps to fix atmospheric nitrogen and contribute to soil fertility improvement particularly in smallholder farming systems. This research was conducted in the Screenhouse of IITA Kano Station in both 2020 and 2021 to (i) assess the genetic variability of nodulation in cowpea accessions (ii) determine the mode of inheritance of nodulation in cowpea. Selected parents (7 females and 7 male) were used for genetic studies using North Carolina design II to generate 49F₁. Among the cowpea accessions screened, TVu-172, TVu-968, TVu-3818, TVu-8016 and TVu-8134 were identified as high nodulating and TVu 18, TVu-254 and TVu-17249 were low nodulating. From the principal component analysis, the first two PCs of the biplot accounted for 58.3% of the total variation among the cowpea accessions. Combining ability analysis showed that both additive and non-additive gene effects were important for the inheritance of nodulation in cowpea with preponderance of additive gene action in controlling number of nodules, which can make selection to be possible at early generation. A high heritability estimate of 77% was obtained for nodulation traits, suggesting effective selection for root nodulation.

Key word: Cowpea, nodulation, yield, genetics, variability

The Effects of Different Rates of Pre-Emergence Herbicide on Weed Species Composition, Growth and Yield in Maize/Cassava Intercrop

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Abstract

This study investigated different rates of pre-emergence herbicide on weed species composition, growth and yield in maize/cassava intercrop. The treatments tested are, Isoxaflutole (75g/L) + aclonifene (500g/l) at 1lit./ha and 1.25 lit./ha rates were applied, with and without hoe-weeding at 6 weeks post-planting. Maize plant height, number of leaves, fresh and dry weight, cassava plant height, number of leaves, weed species composition, relative frequency (RF), relative density (RD), relative importance value (RIV), weed density and weed dry matter weight were subjected to analysis of variance and least significant differences used to compare the means. Significant difference ($P < 0.05$) was recorded among the treatment combinations for maize number of leaves at 6 WAP. The study revealed that pre-emergence herbicide application had minimal effects on the heights of cassava and maize plants. Notably, at 8 WAP, plots treated with isoxaflutole + aclonifene at 1L/ha, along with one hoe-weeding event, exhibited a substantial reduction in grass dry weight compared to other treatments. All the weed species found on each plot recorded high RIV with the highest on weedy check [*Acroceras zizanioides* (RIV = 43.3%)], while the least was the plot treated with isoxaflutole + aclonifene at 1L/ha [*Phyllanthus amarus* (RIV = 6.33%)]. Pre-emergence herbicides had significant effects on weed control and are therefore recommended for maize/cassava intercrop.

Keywords: Pre-emergence herbicide, weed species, intercropping, isoxaflutole, aclonifene

Effects of Intercropping and Integrated Soil Fertility Management on the Growth, Seed Yield and Nitrogen Fixation of Soybean.

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Abstract

Soybean (*Glycine max* Merr.): an economic and nutritious crop with high protein content fixes atmospheric nitrogen thereby improving soil fertility. Maize is a staple crop in Nigeria. Therefore, intercropping them is a feasible way to improve yield and soil fertility. This study assessed performance of soybean intercropped with maize under integrated soil fertility management. The experiment was carried out in LAUTECH with cropping system (main plot) and nutrient sources (subplot) arranged as split-plot in RCBD with four replications. Data collected were subjected to ANOVA using SAS and means compared using LSD0.05. Intercropping with maize improved soybean plant height (39.9 cm) compared with sole soybean (29.60 cm). Combined application of poultry manure with NPK significantly improved plant height (39.3 cm) compared with the control (28.0 cm) but not significantly so for poultry manure (37.0 cm). Intercropping with maize significantly reduced soybean seed yield (201 kg/ha) compared with sole soybean (372 kg/ha). Sole poultry manure produced better yield (501 kg/ha) than combined poultry manure and NPK (209 kg/ha) and the control (149 kg/ha). Intercropping did not significantly affect N-fixation. However, the control fixed significantly higher nitrogen (85.47 %) than sole application of poultry manure (78.08 %) and combined application of poultry manure and NPK (82.72%). In conclusion, intercropping soybean with maize had a positive effect on soybean height and an adverse effect on soybean seed yield. However, the soil amendments were superior to the control in their effects on growth and seed yield of soybean but inferior to the control in N-fixation.

Keyword: Soybean, Plant height, seed yield, Poultry manure and N-fixation

Evaluation of maize (*Zea mays* L.) varieties under low and optimum nitrogen fertilization in Ogbomoso

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Abstract

Maize (*Zea mays* L.) is an important food and feed crop whose cultivation is challenged by several biotic and abiotic stress factors leading to reduced grain yield. In the Ogbomoso, millions of maize farmers cultivate maize under low soil nitrogen conditions. Therefore, this study assessed the agronomic performance of eight maize varieties under low and optimum soil nitrogen conditions. The maize varieties were evaluated under 0, 30, 90 and 150 kg N/ha in a two-year evaluation conducted at the Ladoke Akintola University of Technology's Teaching and Research Farm in Ogbomoso. The experiment was laid out in a randomized complete block design with six replicates and data were collected on agronomic and yield parameters. These were subjected to analysis of variance using the Statistical Analysis System and the mean values of each parameter was estimated and compared using Duncan's Multiple Range Test. Low-N based index was calculated to identify varieties that possess alleles for low-N tolerance. Analysis of variance across soil nitrogen conditions showed significant ($P < 0.01$) differences among maize varieties, soil nitrogen environments, variety \times year interaction and between years of evaluation for grain yield and other agronomic traits. Grain yield significantly varied ($P < 0.05$) under low and optimal nitrogen conditions. The low-N base index highlighted Pioneer 30Y87 and Sammaz 52 as exceptional, excelling across the low soil nitrogen conditions. These maize varieties display potential for achieving high grain yields in resource-constrained agricultural systems.

Keywords: Maize, Nitrogen fertilizer, Variation, Grain yield

Performance of tomato accessions for yield, quality and adaptability to humid environments

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Abstract

The production of tomato (*Solanum lycopersicum* L.) in southern Nigeria face challenges due to excessive rainfall which makes production based in the northern ecologies of Nigeria. Thus, the need to identify genetic materials which could withstand prevailing environmental stress and maintain high productivity in quality and quantity remains a major challenge to tomato breeders in the humid zone of the Nigeria. Hence, the phenotypic variation of quantitative and qualitative traits among exotic and adapted tomato accessions was assessed. This study evaluated 65 tomato accessions from various sources in two humid zones of Nigeria including Ibadan and Ogbomoso using an alpha lattice design with three replications. Data were recorded on fruit yield, agronomic traits and nutritional properties and were subjected to Analysis of Variance using SAS. The mean values of each parameter were also estimated and Ranked Summation Index was used to identify superior accessions. Only 28 accessions demonstrated adaptation to the environments and 50% had fruit yields above 4,000 kg/ha. ANOVA revealed significant ($P < 0.001$) variations among the accessions for fruit yield, flowering and fruiting dates as well as fruit quality traits. Over 50% of the studied accessions had large number of marketable fruits, exhibited firm pericarp, had high lycopene content with desirable fruit shape index. Among all, accessions LA 1714, NHTO 0752, AVTO 2133, NHTO 0400, NHTO 0239 and LA 4345 demonstrated high productivity. These accessions can serve as potential parent combinations in hybridization programmes aimed at developing new tomato cultivars with improved yield and nutritional quality.

Keywords: Accessions, humid zones, tomato, variation

Comparison of some winged bean and African yam bean accessions for seed yield

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Abstract

Winged bean – a multi-purpose underutilized legume from Southeast Asia has proven to improve the livelihood and nutrition of small farmholders and consumers. Introducing this crop to Nigeria will be advantageous. However, there is a need to evaluate the yield performance of winged bean in Nigeria to ascertain the growth and development of the crop in this region. The main aim of this study was to compare the seed yield of winged bean (WGB) to that of African yam bean (AYB) - a morphologically similar legume from West Africa in four agroecological zones in Nigeria, namely Ubiaja, Ikenne, Kano, Mokwa located in the Humid Forest, Derived Savanna, Sahel Savanna, and Southern Guinea Savanna, respectively for the year 2020 and 2021. Five accessions of each legume were planted using a Randomized Complete Block Design in three replicates. Seed yield per hectare was calculated. The data were subjected to analysis of variance (ANOVA) using the R Statistical Tool. The combined analysis of variance for each legume showed significant differences ($p < 0.05-0.001$) effects of location and year on the seed yield per hectare. Ubiaja was significantly different from other locations for both legumes for seed yield. Across all accessions, locations, and years, WGB and AYB had an average yield of 22310.11kg/ha and 20929.77 kg/ha, respectively. The highest yield of WGB was obtained in the humid rainforest area of Nigeria. WGB had more grain yield than AYB and thus can be incorporated into the food system in Nigeria to alleviate malnutrition and poverty.

Keywords: African Yam Bean, Malnutrition, Seed yield, Underutilized, Winged bean

Bulking rate of cassava (*Manihot esculenta crantz*) for root yield at different harvest period

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Abstract

In Sub-Saharan Africa, cassava (*Manihot esculenta* Crantz) is one of the most important food crops and more than 40% of the population relies on it as a source of carbohydrate. Short days to maturity and fresh storage root yield is an important trait of cassava desired by smallholder farmers. Commonly grown varieties are late bulking significant yield losses. This study was conducted to identify high-yielding and early storage root bulking pro-vitamin A cassava genotypes as well as traits associated with early storage root bulking. A trial was implemented with 25 genotypes using a square lattice design with two replications at four harvest periods in Ibadan. Data were recorded on agronomic, physiological and nutritional quality traits which were subjected to descriptive statistics ANOVA and correlation coefficient estimated in R statistical package. The highest fresh yields (43.4 and 48.04 t/ha) were obtained for IBA180049 at 6 and 9 months after planting (MAP), respectively. The yields obtained at 9 MAP were higher than those obtained at 12 MAP for most of the genotypes. Harvest index, storage root number, storage root diameter and storage root length correlated with one another, thus identified as selection indices to achieve high early fresh storage root yield (t/ha) and dry mass yield (t/ha). The study suggests that both source and sink capacities were important for determining early bulking in cassava genotypes.

Keywords: Cassava, early bulking, pro-vitamin A, sink and source

POSTER PRESENTATION

Soil baseline of Igbotako and Ode-aye towns in Okitipupa LGA of Ondo State, Nigeria, to determine efficiency for increased cassava production

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Abstract

Soil analysis was carried out in some locations in Igbotako and Ode-Aye towns both in Okitipupa LGA of Ondo State, Nigeria. The study assessed the physicochemical qualities and identified the microbial presence in the study areas. Soil samples were taken from top soil and sub soil, homogenized and analysed in a standard laboratory. The soil pH values ranged from 5.5 (Igbotako Site1) to 6.5 (Igbotako Site 7), and 6.0 (Ode-Aye Site 11) to 6.7 (Ode-Aye Site 10). The least soil porosity was observed at Igbotako Site 3 (IGB S3) with porosity of 9% and highest (40%) at Igbotako Site 1 (IGB S1). Permeability of soil ranged from 0.05gm/cm to 0.20gm/cm in Igbotako town, but higher in Ode-Aye town with values from 0.10gm/cm to 0.36gm/cm. Moisture content ranged from 5.8% (IGB S4) to 6.8% (IGB S1) in Igbotako and 5.9% (ODS S9) to 7.0% (ODS S11 & ODS S12) in Ode-Aye. Soil Anions were moderate with SO_4 (47.1 mg/kg) at IGB S6. Soil Cations were low to moderate with K^{2+} highest (72.5 mg/kg) at IGB S1. Heavy Metals Pb^{2+} , Ni, As and Cd were not detected in all samples from both locations, organic matter was detected in little amounts. Total Heterotrophic Bacteria (THB) and other soil microbes were present. *E. coli* was not detected in all samples across various sites. The soils in both locations are healthy - contain nutrients that support crop growth but will require extra enhancement through fertilizer application for increased cassava production.

Keywords: Physicochemical, Baseline, Heterotrophic Bacteria, Microbes, Cassava production

Potentials of Artificial Intelligence (AI) tools for weed management to achieve high yield of maize (*Zea mays* L.)

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Abstract

Weed infestation causes more than 37% of the world's total loss in maize production owing to its destructive competition for nutrients, light, space, and water, which are necessary for the growth and development of maize plants. Weeding, an unpleasant farm activity, becomes easy with modern technology which enables farmers to eliminate weeds more effectively and environmentally benignly. The authors hypothesized that precise, effective, and accurate weed control is achievable by using Unmanned Aerial Vehicles (UAVs), like drones coupled with a variety of sensors—including RGB (red, green, and blue), multispectral, and hyperspectral and software uploaded with images of the weeds that are popular in competing with maize. Also, the possibilities of AI techniques such as robotics, computer vision, and machine learning for creative weed management for maize (*Zea mays* L.) are yet to be explored in farm spray of weedicides. In this review, the authors consulted agronomists and AI specialists, about 75 current peer-reviewed references from search engines like Google, ResearchGate, and ScienceDirect. The study reveals the risks involved in AI introduction, adoption, and long-term success. It also explains the immense potential of AI for producing unthinkable outcomes in controlling maize weeds and encourages Nigerian policymakers to invest in its provision and accessibility, especially to both small-holder and commercial farmers.

Keywords: Maize, Weed management, Artificial Intelligent, Yield.

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LIST OF ORAL PRESENTATIONS

- 1. Genomic prediction of yield traits among IITA cassava collections**
- 2. Deconstructed East African Cassava Mosaic Virus (EACMV) can transiently deliver genes into different plant species**
- 3. Characterization of early-maturing cowpea (*Vigna unguiculata* (L.) Walp.) germplasms through association analysis**
- 4. Seasonal dynamics of photosynthetic efficiency and yields among four accessions of *Sphenostylis stenocarpa* (Hochst. Ex A. Rich.) Harms.**

LIST OF POSTER PRESENTATIONS

- 1. Induced genetic variation in pepper (*Capsicum annuum* L.) using caffeine**

ORAL PRESENTATION

Genomic prediction of yield traits among IITA cassava collections

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Abstract

Cassava (*Manihot esculenta*) is a major staple crop for millions of people in the global south and has a lot of potential for further improvement and hence, reducing hunger. Application of genomic selection has been identified as a tool to expedite the development of improved varieties, unlike the time-consuming, expensive, and laborious classical breeding method. In this study, 713 cassava accessions were selected from the seedling nursery containing population from bi-parental crosses at IITA. The clones were established in a Clonal Evaluation Trial (CET) using augmented design. Three months after planting, the lines were genotyped using DArTseq. Fresh Root Yield (FYLD), Dry Matter Content (DM), Dry Yield (DYLD), Root Number (RTNO), and Harvest Index (HI) were then evaluated 12 months after planting. Phenotypic heritability estimates were computed, while Best Linear Unbiased Predictions (BLUP) were de-regressed for genomic analyses. A set of 3,280 filtered Single Nucleotide Polymorphism (SNP) markers facilitated genomic prediction. Genomic heritability was computed, Genomic Estimated Breeding Values (GEBV) were determined, and a standard K-fold cross-validation scheme was implemented to assess the predictive accuracy of the yield-related traits using the Genomic Best Linear Unbiased Prediction (GBLUP) model. The SNP-based heritability of the traits was higher than, and closely matched, the phenotypic estimates, with DM having the highest value. Further, predictive accuracy for all traits ranged from 0.28 (FYLD) and 0.53 (DM) implying moderately high (≥ 0.2) accuracies. This study therefore further affirms the significance of genomic selection as a technique for shortening the breeding cycle in cassava.

Keywords: Cassava, genomic prediction, yield traits, heritability, predictive accuracy.

Deconstructed East African Cassava Mosaic Virus (EACMV) can transiently deliver genes into different plant species

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Abstract

Crop improvement and gene characterization are slowed down by among others, difficulty in gene delivery ascribable to the requirement of embryogenic explant development, a recalcitrant process. Transient gene delivery systems do not require embryogenesis and could therefore, speed up crop improvement and gene characterization. Here, we leverage the ability of East African Cassava Mosaic Virus Kenya (EACMV-K) to infect mature plants in developing a transient gene delivery system. Two EACMV-K deconstructed viruses were generated and used to deliver *Arabidopsis thaliana Flowering Locus T* into three plant species. To mimic natural reassortant viruses, DNA-B that naturally co-exists with the DNA-A was used in co-infiltrations. The EACMV- Δ V1 and EACMV- Δ V2 with their respective payloads were infiltrated into cassava, *Nicotiana benthamiana* and *N. tabacum* leaves alone or in combination with DNA-B. Southern blot analysis at the point of infiltration (POI) demonstrated successful gene delivery and replication in plant species used apart from cassava, which had no observable replicative forms. Systemic deconstructed virus movement was confirmed through positive amplification in PCR of systemic leaves in *N. benthamiana* and *N. tabacum* but not cassava. The findings of this study provide insight into the replication dynamics and systemic movement of EACMV-based vectors and the potential use of viral vectors in gene delivery across different plant species. Further, the study lays a basis for future advancements in gene functional studies, crop improvement, and targeted gene regulation.

Keywords: Transient, EACMV; *AtFT*; virus-based vector

Characterization of early-maturing cowpea (*Vigna unguiculata* (L.) Walp.) germplasms through association analysis.

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Abstract

Early maturing cowpea is a valuable crop for sub-Saharan Africa that offers a number of benefits, including a short growing season, drought tolerance, and the potential to improve food security. This study was conducted to analyze character associations in genetically diverse cowpea (*Vigna unguiculata* (L.) Walp.) germplasm, employing ten distinct accessions within a randomized complete block design with four replicates. Parameters such as days to first flowering, days to fifty percent flowering, number of branches per plant, days to ninety-five percent maturity, number of pods per plant, hundred-seed weight, total pod weight, and total seed weight were subjected to analysis of variance (ANOVA), Correlation, and Path Coefficient Analysis. Results revealed significant positive correlations between "branches per plant and pods per plant ($r = 0.317$, $p < 0,001$)," "pods per plant and pod weight ($r = 0.136$, $p < 0,001$)," and "pod weight and seed weight ($r = 0.567$, $p < 0,001$)." Path coefficient analysis identified pod weight (0.840938) as the most influential direct contributor to yield, while the number of pods (-0.04268) indirectly influenced yield through pod weight. High grain yield selection can be achieved through indirect manipulation of pod weight. Accession IT99K-573-1-1, IT10K-863-11 and IT08K-125-24 exhibited the highest yield characters (pod weight and seed weight) and therefore further studies is recommended to consolidate this work, to enhance adoption by farmers.

Keywords: Cowpea, Character Association, Correlation Analysis, Path Coefficient Analysis.

Seasonal dynamics of photosynthetic efficiency and yields among four accessions of *Sphenostylis stenocarpa* (Hochst. Ex A. Rich.) Harms.

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Abstract

Improving our understanding of crop plants' responses to different environmental situations is critical as the world's climates continue to change. The dietary and climate-resilient African yam bean (AYB) has potentials, but the complex relationship between variations in seasonal yield and photosynthetic efficiency has not been sufficiently addressed. This study aimed at providing insights to the development of climate-resilient and high-yielding varieties, ultimately enhancing agricultural sustainability and food production. In 2022, four AYB accessions (TSs-152, TSs-157, TSs-107, and TSs-96) were cultivated at varied seasons in Randomized Complete Block Design with three replicates at International Institute of Tropical Agriculture, Ibadan, Nigeria. Growing seasons significantly influenced grain and tuber yields, relative chlorophyll (Rchl), proton flux (vH^+), photosystemII quantum yield (Φ_2), linear electron flow (LEF), Electrochromic shift rate (ECSt) among other measured variables. Photosynthetic active radiation (PAR) and LEF maintained a significant positive correlation (0.96***, 0.93***, and 0.95***) in April, July, and October growing seasons respectively. Grain yield showed significant positive correlations with RChl (0.66***), ECStmAU (0.58***), and vH^+ (0.45**), while tuber yield had with RChl (0.37*) and ECStmAU (0.43 **). TSs-107 yielded the least grain (116.22 kg/ha) and the highest tuber (2207.80 kg/ha), while TSs-96 yielded the highest grain (214.89 kg/ha) and TSs-152 yielded the least tuber (9.89 kg/ha). April had the highest grain yield (271.11 kg/ha) and tuber yield (1411.65 kg/ha), while October had the lowest grain yield (38.54 kg/ha) with no tuber yield. This study revealed that seasonal variation significantly influenced photosynthetic efficiency, seed and tuber yield of AYB.

Keywords; African yam bean, climate resilient, crop improvement, photosynthetic efficiency, physiology.

POSTER PRESENTATION

Induced genetic variation in pepper (*Capsicum annuum* L.) using caffeine

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Abstract

Pepper (*Capsicum annuum* L.), a vital spice globally and in Nigeria, boasting medicinal properties like antifungal and antimicrobial activities, faces challenges such as poor yield and stress susceptibility. To overcome these issues, achieving successful crop improvement relies on genetic diversity, attainable through mutation, providing a crucial spectrum of variants for effective selection. This study aimed to induce genetic variability in pepper via caffeine treatment. Seeds were soaked in distilled water for 12 hours and then treated with five coffee concentrations (40 mg per 100 g caffeine) ranging from 20% to 100% (g/v). Treated seeds were planted in the screen house using a three-replicate completely randomized design. Agronomic data such as plant height, days to first flowering and fruit set, number of fruits/plant, average fruit weight, average number of seeds, and fruit yield, obtained were subjected to statistical analysis with SPSS. Significant differences ($P \leq 0.05$) among genotypes indicated substantial variability. High variability parameters (GCV and PCV) were observed, excluding plant height and terminal leaf length, suggesting minimal environmental influence and significant genetic contribution. A 90.70% heritability and high genetic advance over the mean for fruit yield suggest an additive gene influence, with a 0.78 positive correlation between days to first fruit set and fruit yield, indicating potential for larger, early fruiting plants. The study successfully employed caffeine-induced mutagenesis to introduce significant genetic variation in pepper. The observed variations in agronomic traits among genotypes underscore the potential for enhanced crop improvement in addressing the challenge of poor yield in the crop.

Keywords: Agronomic traits, caffeine-induced mutagenesis, genetic variation, mutation, variability parameters

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LIST OF ORAL PRESENTATIONS

- 1. Influence of cassava varieties on the textural attributes and consumer acceptability of *Amala Lafun***
- 2. Effects of drying methods on nutritional contents of three varieties of mango chips (*Mangifera Indica L.*)**
- 3. Effect of fermentation period on nutritional composition, antinutritional factors, and sensory attributes of cassava-orange flesh sweet potato pupuru**
- 4. Assessment of Multiple Antibiotic Resistance Index (MARI) of pathogens isolated from ready-to-eat fruits sold in Abakaliki.**
- 5. Nutritional evaluation of biscuits produced from sweet potato, unripe plantain and mushroom flour blends**
- 6. Evaluation of boiled cassava root mealiness and its consumer acceptability using 9-points hedonic, JAR and CATA test**

LIST OF POSTER PRESENTATIONS

- 1. Nutritional review of corn (*Zea mays L.*), cocoyam (*Colocasia esculenta (L.) Schott*), and rice (*oryza sativa L.*) for a balanced diet**

ORAL PRESENTATION

Influence of cassava varieties on the textural attributes and consumer acceptability of *Amala Lafun*

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Abstract

Information on the suitability of the new varieties of cassava (Game Changer, Farmer's Pride, and Dixon) released in December 2020 in Nigeria to produce lafun is lacking, compared to existing varieties (TME419 and TMS16/4773). *Lafun* is a spontaneously fermented floury cassava root product, consumed by reconstituting in boiled water to form a cooked dough known as *amala lafun*. Textural attributes are the key quality criterion of *amala lafun* that dictate its acceptability and may be influenced by varieties. Therefore, this study aimed to evaluate the textural attributes and consumer acceptability of *amala lafun* produced from different cassava varieties. The sensory and instrumental texture attributes of the *amala lafun* from Game Changer, Farmer's Pride, Dixon, TME419, and TMS16/4773 were done using standard methods, and the consumer acceptability was evaluated in three different locations (Malete, Ilorin, and Shao) within Kwara State using a well-structured questionnaire with fifty (50) respondents per location. The results depict that *amala lafun* from TME419 and TMS16/4773 were softer and more stretchable compared to those of the released varieties which are moderately soft and stretchable. *Amala lafun* from Dixon, Game Changer, and Farmer's Pride was liked in all the locations, while those of TME419 and TMS16/4773 was not liked probably because of the softness and stretchability. Consequently, the cassava varieties, locations, and interactions between the cassava varieties and the locations significantly influenced the acceptability of *amala lafun* among consumers. Thus, cassava processors can produce *lafun* for commercialization using Dixon, Game Changer, and Farmer's Pride.

Keywords: Cassava, amala lafun, acceptability, texture

Effects of drying methods on nutritional contents of three varieties of mango chips
(*Mangifera Indica* L.)

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Abstract

Drying is a simple and affordable alternative technology for reducing the enormous post-harvest losses of agricultural produce in developing countries. However, it may result in nutritional loss if not well applied. An experiment was conducted in the Department of Crop Production and Horticulture, Modibbo Adama University of Technology Yola to determine the effects of drying methods on the nutritional contents of fruit chips of some varieties of mango (*Mangifera indica* L.). Three varieties of mango fruits namely Tommy, Atkins, Keitt, and bush mango were collected, peeled, and dried using oven, sun, and solar drying methods. The dried mango chips were analyzed for ash, carbohydrate, fibre, and moisture contents in the laboratory before and after storage. The treatment combinations were laid out in a split-plot design in a completely randomized design and replicated three times. Data were subjected to analysis of variance (ANOVA). The varieties differed significantly for fresh pulps and dried pulps. Higher amount of ash and carbohydrate contents was observed in Keitt variety compared to Tommy, Atkins, and the bush mango varieties for both fresh and dried pulp. Solar drying was more superior in retaining nutritional contents after drying. The crude fibre was not significantly affected ($P \geq 0.05$) by oven, sun and solar drying methods. Mango processors are therefore encouraged to employ the use of solar dryers for drying, particularly Keitt mango variety.

Keywords: Fibre, mango chips, moisture, proximate, oven drying, solar drying.

Effect of fermentation period on nutritional composition, antinutritional factors, and sensory attributes of cassava-orange flesh sweet potato pupuru

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Abstract

Co-fermentation was carried out on blends of four cassava and orange-fleshed sweet potato in the ratio of 75:25%, 25:75%, 50:50%, and 0:100% (cas: ofsp) respectively. The products obtained were evaluated for proximate composition, anti-nutritional factors, and sensory properties using standard method. The result obtained for moisture, protein and fat for blends of (cas:ofsp) ranged for 75:25% (9.93-6.71 %), (4.45-5.11) and (0.17 - 0.82%), 50:50% blends (10.3-6.28%), (5.46%-5.35%) and (0.20-0.82%), 25:75% blends (9.85-6.59%), (5.17-5.29%) and (0.60-0.84%), 0:100% blends (10.7%-7.60%), (4.50-4.99%) and (0.14-0.82%) from 0 to 96 hour. The total carbohydrate decreased with the blends of pupuru obtained. The highest beta carotene content of cassava:ofsp blend was 2.14mg/100g for 75:25%, 2.20mg/100g for 50:50%, 2.56mg/100g for 25:75%, and 3.11mg/100g for 0:100% and was found to be ~5 times significantly ($p < 0.05$) higher than the 100% cassava at 96 hours of fermentation. The result obtained for the phytate and oxalate ranged for 75:25% blends (4.32 -2.51) and (80.63 -38.8), 50:50% (4.02 to 2.23) and (80.1 - 37.1), 25:75% (3.45 - 2.23) and (80.8-37.5), 0:100% (3.05 to 2.20) and (87.5 to 39.0) mg/100g respectively. The sensory score indicated that 75:25% (cas:ofsp) at 72 hrs was the most acceptable when compared with the control samples and showed no significant differences ($p < 0.05$). Aroma and colour were rated high for 75:25% (72 hrs) and 50:50% (96 hrs) (cas:ofsp) samples of pupuru analogue produced when compared with pupuru from 100 % cassava were preferred most. This indicates that supplementation of cassava with ofsp would greatly improve the nutritional quality of the “pupuru” analogue produced.

Keywords: “pupuru”, substitution, orange-fleshed sweet potato (ofsp), cassava (cas)

Assessment of Multiple Antibiotic Resistance Index (Mari) of Pathogens Isolated from Ready-To-Eat Fruits Sold in Abakaliki.

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Abstract

The importance of fruits to man cannot be overemphasized as they fall under the classes of food as vitamins and roughages. However, they can get contaminated during production or processing stage, and can pose health threats to man. Nine samples of Pineapple, watermelon and pawpaw from different vendors in Abakaliki were labelled and taken to AE-FUNAI microbiology laboratory for analysis. Standard microbiological procedures were observed. Pure isolates were subjected to biochemical tests. Ten antibiotics were used for susceptibility test, and multiple antibiotic resistance index (MARI) were calculated. From the results, *Escherichia coli*, *Shigella*, *Klebsiella*, *Penicillium* and *Aspergillus* sp. were isolated. The total viable plate count ranged from $1.1 \times 10^3 - 5.7 \times 10^3$ cfu/ml for pawpaw, $2.6 \times 10^3 - 6.9 \times 10^3$ cfu/ml for pineapple and $2.4 \times 10^3 - 6.9 \times 10^3$ cfu/ml for watermelon, while *Penicillium* and *Aspergillus* were 4.4×10^3 and 8.0×10^3 cfu/ml. The isolates showed strong indication of animal waste contamination, and most of the isolates were resistant to gentamycin, ciprofloxacin, chloramphenicol, pefloxacin, ceftriaxone, amoxicillin and streptomycin. The high MARI values (0.7, 0.4, 0.3, 0.5 and 0.6) above 0.2 obtained suggest the exposure of the isolate to antibiotic pressure thus increasing multidrug resistance in the environment.

Keywords: Assessment implication, antibiotic resistance, index, pathogens, ready-to-eat, fruits.

Nutritional Evaluation of Biscuits Produced from Sweet Potato, Unripe Plantain, and Mushroom Flour Blends

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Abstract

Sweet potato, unripe plantain, and mushroom flour blends were produced and their potential for biscuit production was investigated. The blends of sweet potato, unripe plantain, and mushroom flour were formulated, with 100% wheat flour biscuit as control. The formulated flour blends were in the ratio 90:0:10, 0:90:10, 50:40:0 40:50:10, 100:0:0, 0:100:0 and 0:0:100. The chemical, functional, physical, and sensory properties of the biscuit produced were evaluated using standard analytical methods. The result showed that sample 100% wheat (control) has the highest moisture and protein content value compared to other samples. Ash and fat values of flour of the supplemented biscuit were significantly ($p < 0.05$) higher than that of the control. The fibre content of the samples 90:0:10, 0:90:10 and 50:40:0 were not significantly ($p > 0.05$) different from the control, and sample 90:0:10 has the highest carbohydrate values. The energy value ranges from 358.01 to 464.14kcal/100g. The loose bulk density of flour ranged from 0.24g/ml to 0.54g/ml while packed bulk density ranged from 0.35g/ml to 0.77g/ml. Sample 50:40:0 has the highest water absorption capacity and oil absorption capacity but the lowest dispersibility value compared to samples 90:0:10, 0:90:10, and 40:50:10. There was only little significant ($p > 0.05$) difference in the length, weight, diameter, and spread ratio of the biscuit, However, there was no significant ($p < 0.05$) difference in the thickness of flour blends biscuit and control. The sensory score showed that sample 100:0:0 was compared favourably with the control sample, as this would enhance the utilization of these underutilized crops.

Keywords: Functional, Underutilized, Formulation, Blends, Chemical

Evaluation of boiled cassava root mealiness and its consumer acceptability using 9-points hedonic, JAR and CATA test.

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Abstract

This study aimed at identifying the descriptors of cassava roots mealiness from consumers' end and evaluate consumer acceptability of boiled cassava roots. A well-structured questionnaire comprising of a 9-points hedonic, Just About Right (JAR) and Check-All-That-Apply (CATA) test was administered to 120 respondents to elicit information on cassava root mealiness attributes and to evaluate four cassava varieties (*danwarri*, *suppi*, *akpu*, *dangbo*) for consumers' acceptability of boiled cassava in the selected LGAs of Benue State, Nigeria (Vandekya, Ushongo, Konshisha and Gwer East) using multistage sampling techniques. Data collected were analyzed using statistical package for social scientists (SPSS) and XLSTAT packages. The 9-points hedonic test shows that *danwarri* (7.48) \geq *suppi* (6.68) \geq *akpu* (5.44) \geq *dangbo* (4.19) in that order. The CATA test shows that the most important mealiness attributes of boiled cassava roots were dissolving easily (80%) \geq easy to chew (78%) \geq moderately soft (76%). The JAR test results also revealed that softness and chewiness of *danwarri* and *suppi* scored above 50% just about right values. This information with an in-depth laboratory characterization of the raw roots will assist breeders in developing an improved cassava varieties that are mealiable and acceptable to produce value addition products.

Keywords: Chewiness, softness, Just-About-Right, Check-All-That-Apply, mealiness

POSTER PRESENTATION

Nutritional review of corn (*Zea mays* L.), cocoyam (*Colocasia esculenta* (L.) Schott), and rice (*Oryza sativa* L.) for a balanced diet

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Abstract

In Nigeria with limited dietary options and nutritional deficiencies, understanding staple crops' nutritional value is crucial. Despite their dietary significance, a substantial knowledge gap hinders effective interventions tailored to nutritional needs. This review assesses the nutritional value of three key crops: corn (*Zea mays* L.), cocoyam (*Colocasia esculenta* (L.) Schott), and rice (*Oryza sativa* L.), and their role in achieving a balanced diet, especially in regions with limited dietary options and nutritional gaps. Corn, a source of energy and B-vitamins, needs to be paired with nutrient-rich foods due to its incomplete protein and lower mineral content. Cocoyam, a nutritious root vegetable rich in vitamins and minerals, should be consumed with consideration for its oxalate content. Brown rice, enriched with more vitamins, minerals, and fiber, is a preferable option to regular rice. The review underscores the importance of dietary diversity for balanced nutrition, recommending various foods to ensure comprehensive nutrients. Practical measures like mixed meals and food fortification are suggested to enhance nutritional intake. Endorsing traditional recipes and fermentation techniques, the findings advocate a holistic approach, considering both practical and cultural aspects to address nutritional gaps. Proper nutrition education and informed food choices are essential for addressing deficiencies and promoting public health. In essence, a balanced diet incorporating these crops can enhance global nutrition and support healthier, sustainable food systems.

Keywords: Nutritional Value, Corn, Cocoyam, Rice, Balanced Diet

Plenary Chairperson: Dr. Lava Kumar

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LIST OF PRESENTATIONS

- 1. Influence of fertilizers and herbicides on aflatoxin concentration in sesame grains across some selected states in Nigeria.**
- 2. Understanding the factors influencing seed transmission of bean common mosaic virus (BCMV) in cowpea (*Vigna unguiculata* L. Walp.)**
- 3. Insect Conservation as a Tool for Food and Nutritional Security**
- 4. Biotic constraints of taro (*Colocasia esculenta*) in Nigeria**

LIST OF POSTER PRESENTATION

- 1. Combating fall armyworm (*Spodoptera frugiperda*): strategies for sustainable agriculture and food security in Nigeria**

ORAL PRESENTATION

Influence of fertilizers and herbicides on aflatoxin concentration in sesame grains across some selected states in Nigeria

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Abstract

There is a rise in desire for food safety and the use of herbicides by farmers to enhance crop yield is alarming. Sesame is a highly nutritive crop, which accumulation of those herbicides and fertilizer often leaves toxic effects on crop. Aflatoxins are poisonous-chemicals produced by *Aspergillus flavus* and *A. parasiticus* (molds) which are linked with immune suppression and cancer in human and found in food crops such as maize and sesame. Therefore, the objective of this study was to determine the aflatoxin concentrations in sesame grains from sixteen selected Local-Government-Areas (LGAs) from prominent state producers in Nigeria. The purposeful selection was used in all the LGAs: Doma, Obi, Lafia, Awe, Keana, Shamdan, Quan-Pan, Langtang South, Giyade, Shira, Kafin-Madaki, Lapai, Bida, Agaie, Lavun and Katcha and the States Nasarawa, Plateau, Bauchi and Niger. Sesame grains of 1 kg obtained from each LGAs were bulked as composite sample, taken to Analytical Laboratory for Aflatoxin determination using standard-procedures. Results showed highest aflatoxin concentrations >30 and 29 µg/kg in sesame grains from Agaie and Lafia LGAs in Niger and Nasarawa States respectively which exceeded the values of 4 µg /kg and 10-20 µg /kg for EU and Nigeria standards. Lowest concentration >1.2 µg/kg was obtained across the LGAs in Plateau and Bauchi States, which was below Nigeria's acceptable limit. It could be suggested that organic agronomic practices should be used to reduce aflatoxin concentrations in sesame grains, hence promoting food safety.

Keywords: Local Government Areas (LGAs), Acceptable limit, Sesame, Food safety

Understanding the factors influencing seed transmission of bean common mosaic virus (BCMV) in cowpea (*Vigna unguiculata* L. Walp.)

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Abstract

Cowpea (*Vigna unguiculata* L. Walp.) is an annual tropical grain legume that plays an important role in the nutrition of people in developing countries. Bean common mosaic virus (BCMV, genus *Potyvirus*) is one of several viruses reported to affect cowpea production in Nigeria. The age of the plant at the time of infection is among the major determinants of plant response to viral infection. A study was conducted to evaluate six cowpea genotypes (RS001, RS106, RS018, RS030, RS004, and RS012) and different times of inoculation with BCMV (uninoculated plants, inoculation at primary leaves, apical leaves, and at flowering stage) on cowpea phenotype and seed transmission under screenhouse conditions at IITA, Ibadan, Nigeria. The experiment was laid out as a 4 × 6 factorial in a completely randomized design (CRD) with six replications. Data on morphological, phenological, and symptom severity were subjected to analysis of variance (ANOVA) to determine significant differences among treatments using the Genstat package. The difference among treatment means was separated using Fisher's least significant difference (F-LSD) at a 5% probability level. Genotype significantly influenced all traits measured, with the RS106 performing better in most growth traits. Early inoculation significantly affected growth, yield, and symptom severity. Uninoculated plants of genotype RS012 performed better in most yield traits, while the interaction of genotype RS004 with early infection performed the least in most traits. The RS001 and RS106 showed mild to moderate, while RS004 and RS012 showed high disease severity. This ongoing study provides clues to factors influencing BCMV seed transmission.

Keywords: Cowpea, genotypes, BCMV, inoculation, phenotype, mechanism, seed transmission

Insect Conservation as a Tool for Food and Nutritional Security

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Abstract

Interest in climate-smart agriculture, food security, and nutrition is rising due to the continued effects of climate change and the projected rapid growth in the world population. Due to the scarcity of agricultural land in the future and the increased demand for food, crop yields must be increased through sustainability and environmental effects. The composition and effectiveness of ecosystems are influenced by the interactions between different soil-dwelling species and the abiotic environment. Diverse soil-dwelling species interact with the abiotic environment to influence the structure and functioning of ecosystems. Soil is a multicomponent, multifunctional system. In addition to providing various ecosystem services like maintaining plant production and water quality, healthy soil also regulates the decomposition and recycling of soil nutrients. It functions as a dynamic living system. Insects are both ground-dwelling and flying, these are organisms with a variety of feeding and behavioural traits, including burrowing and predatory behaviour, which lead to processes including the breakdown of nutrients, the translocation of organic matter, the breaking down and decomposition of soil, the construction of soil structures, and ultimately the management of water. Insect conservation can be achieved by introducing insect friendly habitat, pollution mitigation and cultured insects. Reports across the world show that insect potentially enhances agro-allied services, soil health, food security, and nutritional value. Utilizing this fauna's potential as an intervention strategy is essential for promoting rich, healthy soil and higher plant yields. As a result, this study reviews how insect conservation could be used to promote food and nutritional security.

Keywords: Insect, conservation, soil quality, nutritional security, food security, plant yield

Biotic constraints of taro (*Colocasia esculenta*) in Nigeria

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Abstract

Taro is an important tuber that is intertwined with the socio-economic life of millions in Nigeria but its production has been on a downturn for over a decade. Taro is majorly produced in the derived savanna and humid forest agroecology; therefore, a survey was conducted in selected states in the major taro-producing areas during the 2021-22 season. The survey was done on 53 farms and eight markets across 7 states (Oyo, Ekiti, Ondo, Kwara, Akwa Ibom, Ebonyi, and Anambra), and examined pest and disease factors affecting taro production in Nigeria. Seventy-seven taro cultivars were obtained from 19 fields and 262 corms were obtained from 26 marketers across the markets. The study assessed the prevalence, incidence, and severity of taro leaf blight (TLB) caused by *Phytophthora colocasiae*, virus infections, and other biotic constraints. TLB prevalence was 83%, with 5-100% incidences averaging at 63.4%. Severity, measured on a scale from 0 (no disease) to 4 (76-100% necrosis), ranged from 1 to 2.5, averaging at 1.3. Virus symptoms were absent on farms but appeared in 27% of emerged plants from the cultivars obtained from the fields. In the 26 market lots, 19.2% of emerged corms showed virus symptoms. Dasheen mosaic virus was detected in all symptomatic plants, the first official report of DsMV in Nigeria. DsMV incidence, although low, might increase due to the reuse of planting materials. Farmers perceived TLB as a major threat to taro production and desired resistant varieties. The study offers important insights into taro production challenges in Nigeria.

Keywords: taro, taro leaf blight, Dasheen mosaic virus, farmers, survey

POSTER PRESENTATION

Combating fall armyworm (*Spodoptera frugiperda*): strategies for sustainable agriculture and food security in Nigeria

*Emmanuel Bassey EFFA¹ and Olumayowa Joseph IYANDA²

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Abstract

The fall armyworm (*Spodoptera frugiperda*), a highly destructive global agricultural pest that targets corn, has worsened crop losses, particularly for maize, which is already stressed by climate change in sub-Saharan Africa. The high invasiveness of this adaptable pest is attributed to its ability to spread through the transportation of fruits and vegetables. Climate change may further expand its reach, causing additional crop damage. This review discusses the fall armyworm's behaviour, adaptability to temperatures, and control strategies. Integrative pest management, which combines monitoring, research, awareness, and support for farmers, is an effective approach. The paper delves into the effective control of Fall Armyworm (FAW) by examining the use of insecticides and microbial agents. It underscores the significance of employing these strategies in tandem with breeding for multi-trait host-plant resistance. Emphasizing the need for integrated pest management plans, the review highlights insecticides and microbial agents as pivotal tools in FAW management. In this context, it advocates for increased attention to research and implementation of these methods. Furthermore, the paper stresses the importance of enhancing food production, processing, and exports as integral measures to fortify food security in Nigeria. In conclusion, a comprehensive approach that integrates insecticides, microbial agents, and host-plant resistance breeding is recommended to address the multifaceted challenges posed by FAW while fortifying the agricultural sector.

Keywords: fall armyworm, *Spodoptera frugiperda*, agricultural pest, climate change

Plenary Chairperson: Prof. Janice Olawoye

Affiliation: Proprietress, King's College

Position: Professor, Rural Sociology

LIST OF ORAL PRESENTATIONS

- 1. Productivity of small and medium-scale agricultural and related industries in Nigeria**
- 2. Potential Adoption of Hydroponics Fodder Production Among Fulani Pastoralists in Ogun State, Nigeria**
- 3. Promoting the Role of Agricultural Extension in the Adoption of Climate-Smart Agriculture among Root and Tuber Crops Farmers in Nigeria**

LIST OF POSTER PRESENTATIONS

- 1. Leveraging digital possibilities in extension service delivery for enhanced climate-smart agriculture adoption by smallholder farmers in Nigeria**
- 2. Nigeria's sustainable agriculture and food security nexus: The vital contribution of extension agents**
- 3. Assessment of climate information needs among farmers in southwest Nigeria**
- 4. Asset accumulation: Best economic welfare index for assessment of commercialization among rural farmers in developing countries**
- 5. Assessing climate change adaptation strategies and determinants among smallholder maize farmers in southwestern Nigeria**

ORAL PRESENTATION

Productivity of small and medium scale agricultural and related industries in Nigeria

*Abegunde Tewogbade Modupe and Ajetomobi Joshua Olusegun

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Abstract

Small and Medium Scale (SME) enterprises play significant roles in the economy of every nation. Despite their relevance, the potentials to alleviate youth unemployment is yet to be explored in Nigeria. The main objective of this study, therefore, is to empirically analyze the productivity of small and medium scale agricultural and related industries in Nigeria. Specifically, the study (i) described the socio economic and demographic profiles; (ii) compared their productivities; (iii) examined the factors influencing their productivities; and (iv) investigated the productivity differences between small and medium Agricultural and related industries in Nigeria. Secondary data obtained from the World Bank Enterprise survey was used for the study. The total number of firms observed was 2452. Descriptive Statistics was used to describe the demographic profiles and Solow residual econometric approach was used to derive the productivity of various industries while Least Square Dummy Variable (LSDV) and Ordinary Least Square Regression (OLS) methods were used to examine the determinants of the estimated productivity. The result showed that the determinants of SME's productivity in Nigeria include firm size, firm ownership, credit access, obstacles, business climate, location, fixed effects, innovation, infrastructure, communication, demographic profile, market, competitors, corruption, and labour competence. The result indicates remarkable sectoral and regional productivity gaps in Nigerian SMEs. To improve SME productivity, the study therefore recommends that SME owners should maximize innovative avenues such as product, market, and process innovation. The obstacle posed by competitors could be handled by emphasizing on branding, good customer relation, and price advantage.

Keywords: Productivity, small and medium scale, agricultural industry

Potential adoption of hydroponics fodder production among Fulani pastoralists in Ogun state, Nigeria

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Abstract

This study examined the potential adoption of hydroponics fodder production (HFP) among Fulani Pastoralists (FPs) in Ogun State, Nigeria. Due to the observed low awareness of FPs about HFP, the FPs were sensitized, trained and involved in an on-farm adaptive research (OFAR) on HFP. A multistage sampling procedure was used in sampling 86 respondents from Odeda and Abeokuta North Local Government Areas. Potential adoption was measured at nominal level with three response options - Adopted, Not adopted, and Undecided. Primary data on socio-economic characteristics, characteristics of HFP as perceived by FPs, potential adoption and constraints to adoption of HFP were obtained using an interview guide and Focus Group Discussions and analyzed using frequency count, percentage, mean and Chi-square statistics. Results revealed that majority of the FPs were male (97.7%), married (96.5%), and had no formal education (90.7%). Also, majority of the FPs consider that the use of HF has relative advantage (98.8%), is compatible with existing practice (96.5%), not complex (94.2%), can be tried (80.2%), and observable (100.0%). The majority (93.0%) of the FPs adopted HFP upon the completion of the OFAR. It was further revealed that the high cost of grains ($\bar{x} = 1.24$), lack of effective extension service ($\bar{x} = 1.22$), inadequate finance ($\bar{x} = 1.19$) and inadequate water ($\bar{x} = 1.17$) were envisaged to severely affect FP's adoption of HFP. The study concluded that there is a high potential adoption of HFP among the Fulani pastoralists. It is recommended that extension

personnel conduct follow-up training on hydroponics fodder technology among FP to address the envisaged constraints and convert the potential adoption into actual adoption.

Keywords: Conflict, envisaged constraint, fodder production, hydroponics, potential adoption.

Promoting the role of agricultural extension in the adoption of climate-smart agriculture among root and tuber crops farmers in Nigeria

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Abstract

The impact of climate change on agriculture, especially in vulnerable regions like Africa and Nigeria, has become increasingly evident. Climate Smart Agriculture (CSA) has emerged as a promising strategy to address these challenges by simultaneously increasing productivity, building resilience, reducing greenhouse gas emissions, and contributing to food security. However, the effectiveness of CSA relies heavily on the role of agricultural extension services in disseminating knowledge and promoting climate-smart practices. This paper reviews existing literature on the role of agricultural extension in climate change adaptation, covering publications from 2000 to 2022. The study focuses on smallholder farmers in Nigeria, particularly the multifaceted dimensions of Climate Smart Agriculture (CSA) and the roles of extension services in promoting climate-smart practices among them. The specific objectives of the study are: (1) to assess the role of agricultural extension in promoting climate-smart practices, (2) to identify barriers hindering smallholder farmers' access to extension services, and (3) to explore innovative approaches to climate change adaptation in agricultural extension. The paper discusses how extension services can facilitate technology and management information dissemination, foster capacity development, and contribute to the successful implementation of policies and programs designed to bolster climate resilience in agriculture. It also highlights innovative approaches to climate change adaptation in agricultural extension, emphasizing the importance of climate awareness campaigns, training, farmer-to-farmer extension, and more. The study concludes by underlining the pivotal role of agricultural extension in building climate resilience in agriculture and the importance of addressing research gaps to enhance adaptation efforts.

Keywords: Climate Smart Agriculture, agricultural extension, smallholder farmers, technology dissemination, capacity development, Nigeria.

POSTER PRESENTATIONS

Leveraging digital possibilities in extension service delivery for enhanced climate-smart agriculture adoption by smallholder farmers in Nigeria

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Abstract

Climate-smart farming practices are imperative, as evidenced by the significant effects of climate change on food security and rural lives. Services for agricultural extension are essential for encouraging adoption. However, there are numerous obstacles facing the current extension systems in developing countries, some of which include inadequate number of extension officers and insufficient funding. The agricultural industry has embraced information and communication technologies (ICTs) since the COVID-19 pandemic to transform the provision of extension services. Digital platforms enable educated decision-making by offering weather forecasts, market trends, and climate-smart agriculture information in real time. Real-time information and research-based adaptability are made possible by data-driven tools. By lowering the expense of traditional extensions, these digital options improve accessibility. Challenges still exist, though. Access is restricted by the digital divide, training in digital literacy is necessary, and data security issues need to be resolved. To fully utilize digital technologies in advancing climate-smart agriculture, these gaps must be closed. Building partnerships, training stakeholders, community engagement, access to finance, policy support and investing in rural infrastructure are all necessary to close the gaps in the use of digital technology for climate-smart agriculture.

Keywords: Climate Smart Agriculture, Information and Communication Technology (ICT), Digital divide, Agricultural extension services

Assessment of climate information needs among farmers in Southwest Nigeria

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Abstract

This study was carried out to assess climate information needs among farmers in Southwest Nigeria. Six states in South West Nigeria were used for the study and farmers were randomly sampled via standard stratified cluster technique. A total of 1,440 farmers were interviewed for the study and primary data was used to collect farmers' personal details and farm information through the use of well-structured questionnaire which was designed using ODK app installed on android devices. Once the respondents completed the forms it was submitted to the cloud server from where they were downloaded and collated for analysis. Descriptive statistics was used to analyse the data and the results revealed that mean years of farming experience was between 11 – 20 years. More than 50 % of the farmers had farm size more than 3 acres and majority of the farmers produced cassava and maize. About 90.28% of the farmers are aware about climate change and 34.31%, 50.35% and 15.35% of them expressed high, moderate and low vulnerability of farming activities to climate change challenges. Majority of the respondents showed high receptivity to an early warning system by indicating they were highly in need of regular climate information so as to combat problems of climate change in the study area. Major climate information needs in the study area are; an early warning system, periodic weather outlook, localized community forecasting, and alert on disease and pest infestation. Major indication of advisory services are for irrigation management control and flood control. By this result, we conclude that climate information needs were very important for farm operations. We also recommend the use of climate information needs among farmers to help forestall the impact climate change disasters on their farms.

Keywords: Climate information needs, Open Data Kit, baseline information, agricultural data, climate change, South West, Nigeria.

Nigeria's sustainable agriculture and food security nexus: The vital contribution of extension agents

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Abstract

Given the adverse effects of climate change and the need for increased agricultural production to feed the growing population, this study investigates sustainable agriculture as the foundation for ensuring food and nutrition security, by responsibly managing resources, promoting environmentally-friendly farming practices, and making food available to people, at all times and in a clean environment to ensure a healthy life for all. Extension agents, as key intermediaries, have a vital role in disseminating sustainable agricultural information. Our review, therefore, explores the dynamic link between sustainable agriculture and food security, emphasizing the pivotal role of extension agents in Nigeria. The roles of extension agents encompass educating farmers on soil water management, disease-resistant inputs, conversion of waste to compost, substituting chemical fertilizers for organic manure, tillage-smart initiatives, and fossil burning reduction. However, challenges exist in the dissemination of climate-smart information. Limited knowledge with respect to sustainable agricultural practices, limited resources allocated for dissemination of climate-smart knowledge, high extension agent-farmer ratio, among others. To address these challenges, our study recommends; capacity building for extension agents, use of E-Extension, and a more coordinated approach among others. Addressing these challenges is crucial for enhancing extension services and ensuring sustainable agriculture and food security in Nigeria.

Keywords: Challenges, Extension Agents, Food Security, Nigeria, Sustainable Agriculture

Asset accumulation: Best economic welfare index for assessment of commercialization among Farmers in developing countries

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Abstract

Over the years, numerous economic well-being researches in rural areas of developing countries have focused on understanding the effects of agricultural operations on farmers' economic welfare. Such endeavors have relied on income and expenditure, particularly from a utilitarian perspective. The relationship between utility and household consumption or utility and household income of crop farmers in those developing countries has been investigated (BLS 2023). No doubt, on numerous assessments, household expenditures were considered a suitable proxy for welfare, but they were, however, measured with large errors. In sum, there were myriads of obstacles in obtaining a reliable and comparative analysis based on consumption and expenditure data surveys. This review paper proposes the use of asset accumulation as a relatively better yardstick in evaluating the influence of crop commercialization on the economic welfare of farmers in these rural areas. This would relieve scholars from having to evaluate the income/expenditure status of farmers. Among other methods of measuring welfare, the recommendation of asset accumulation using polychoric component analysis (a variant of principal component analysis) offers more stability. (Caroline *et al.*, 2007). The main advantage of this PCA variant is its ability to use ordinal data to rank each asset. However, PCA, in all its variations, is still dependent on the observed variables being positively correlated.

Keywords: Welfare, commercialization, asset, income, and consumption

Assessing climate change adaptation strategies and determinants among smallholder maize farmers in southwestern Nigeria

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Abstract

Climate profoundly affects agricultural productivity, necessitating an understanding of smallholder farmers' strategies. This study explores adaptation strategies among smallholder maize farmers in Southwestern, Nigeria. Using multistage random sampling, 540 respondents were surveyed in the 2022 production year. Descriptive statistics and the Double-hurdle model revealed that many criteria were insignificant in determining climate change adoption intensity during decision-making in the research area.

The Double-hurdle model indicates significant factors influencing climate change adaptation adoption, such as age, education, primary occupation, farm ownership, size, climate information, and experience (1%), while marital status and land tenure are significant at 10%, and farming household size at 5%. Results also highlight determinants like information on climate change and farming experience ($P < 0.01$), household size, major occupation, primary income source, and climate change awareness ($P < 0.05$), as well as the educational level ($P < 0.10$) affecting adaptation intensity. Despite critical factors influencing adaptation decisions, they did not significantly impact adaptation intensity in the studied area. Thus, prioritizing farmer education and information dissemination in government policies is crucial, particularly for Nigeria's smallholder farmers.

Keywords: Climate change adaptation, Agricultural productivity, Double-hurdle model, smallholder farmers, Nigeria

LIST OF ORAL PRESENTATIONS

- 1. Sainte-Marie's mangrove evolution between 2016-2020 (Madagascar)**
- 2. Innovative solutions to reduce gas flaring for sustainable agriculture**

Innovative solutions to reduce gas flaring for sustainable agriculture

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Abstract

This comprehensive review highlights the urgent need for intervention in addressing the critical challenges posed by gas flaring in Nigeria, particularly its severe impact on agriculture. This delves into the environmental, economic, and health dimensions of gas flaring. Environmental consequences encompass the release of greenhouse gases, soil degradation, and harm to water resources and aquatic ecosystems. Economic implications range from missed gas utilization opportunities to reduced crop yields and increased healthcare costs due to air pollution. The health effects on agricultural workers, local communities, and crop prompt a call for immediate action. The review evaluates ongoing initiatives to mitigate gas flaring, emphasizing associated gas utilization, and offers policy recommendations. Innovative solutions, including gas-to-power technologies and mobile biogas units, are presented to convert flared gas into electricity and provide on-site processing in remote agricultural areas. Novel irrigation systems are introduced to efficiently use flared gas, addressing energy needs and water scarcity simultaneously. Proposals for decentralized gas processing units near oil fields aim to capture and utilize flared gas locally, minimizing transportation costs and promoting community-based solutions. The dual benefit of gas conversion into fertilizers is underscored, addressing flaring concerns while enhancing soil fertility. Essential components for progress include public-private partnerships and incentive programs to motivate industries toward sustainable practices. Advocacy for smart monitoring technologies for efficient regulation is emphasized. In conclusion, the review advocates for a holistic approach that integrates technological innovation, community engagement, and robust regulatory frameworks to establish a sustainable balance between energy demands and environmental preservation in agriculture.

Keywords: Climate Change, Gas Flaring, Nigeria, Agriculture, Greenhouse Gas

Sainte-Marie's mangrove evolution between 2016-2020 (Madagascar)

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Abstract

Mangroves are among the most productive ecosystems in the world, yet they are the most threatened by human activities. As a result, the issue of mangrove restoration has become a major concern for the scientific community. Sainte-Marie occupies 50% of Madagascar's eastern mangrove and provides a wide range of services for the local community. It also plays an important ecological role by protecting the area. However, population growth is the main factor causing its degradation combined with overfishing, backfilled of mangrove swamps and waste deposit around the area. This study contributes to the preservation of Sainte-Marie's mangroves by assessing the five-year evolution of its vegetation cover. Data were collected, processed and analysed using cartographic (sentinel 2.0 and QGIS 3.18) and R4.3.1 statistical software, supported by the direct field observations. Of the total size of the mangrove, 25.47 ha were showing signs of disappearing in 2016, while by 2020 the loss in term of surface was 24.18 ha. About 13.027 ha of loss is estimated for Sainte-Marie after ten years if any solution has not put in place. Despite these losses, rehabilitation and restoration projects are the best alternative for preserving this ecosystem.

Keywords: mangrove, Sainte-Marie, evolution, restoration, ecological

ABOUT IARSAF

IARSAF is an acronym for: International Association of Research Scholars and Fellows. It is an international body of Postgraduate students in areas of Agriculture and related disciplines, conducting their research at IITA in close collaboration with hundreds of partners under the co-supervision of CGIAR researchers and their respective Universities across the globe.

VISION STATEMENT

Ensuring poverty eradication, nutrition and food security, and improving natural resources and ecosystem through a global research partnership for a food-secure future.

MISSION STATEMENT

Continuous collaboration with researchers to advance agricultural science and innovation, improve productivity and resilience in managing economic growth, natural resources and other challenges.

STATEMENT OF OBJECTIVES

IARSAF is a non-political association, which seeks to:

1. Provide a forum for the exchange of academic and research ideas among its members.
2. Establish and promote a spirit of friendship, tolerance and humility among its members through social activities.
3. Discuss, suggest and/or seek solution to problems affecting members.

MEMBERSHIP OF IARSAF

1. Membership shall be by virtue of an appointment as a research scholar, research fellow, or visiting research student of the International Institute of Tropical Agriculture (IITA) or any of the CGIAR consortiums.
2. Membership shall also be open to short-term trainees.
3. Membership of IARSAF shall be voluntary.
4. Only registered member shall benefit from the Association.

IARSAF PARTNERS INFORMATION

IARSAF partners with International, National and Regional Research Institutes, Civil Society Organizations, Academia, Development Organizations, and the Private Sector.

ANNEX 2



International Association of Research Scholars and Fellows (IARSAF)

International Institute of Tropical Agriculture (IITA)

26TH ANNUAL SYMPOSIUM (27th - 30th November 2023)

Theme: Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security

PROGRAM OF EVENTS

DAY 1: NOVEMBER 27, 2023

EVENT	FACILITATOR	TIME
Login/Arrival of Guests/Registration		08:45 – 09:00am
Introduction of Special Guests	Priscilla Aiyedun, Ademola Adebisi Moderators	09:00am
Welcome Address	Dr. Ehui Simeon DG, IITA	09:05am – 09:15am
Goodwill Message from the DDG, R4D.	Dr. Bernard Vanlauwe DDG, R4D	09:15am – 09:25am
Brief Background to IITA Fellowship Program	Dr. Kenton Dashiell DDG P4D.	09:25am – 09:35am
Goodwill Message from the Director, West Africa Hub	Prof. Michael Abberton Director, West Africa Hub	09.35am – 09.45am

Goodwill Message from the Head, Capacity Development Office	Ms. Sore, Zaina Head, Capacity Development Office	09:45am – 09:55am
Group Pictures	All Participants	09:55am – 10:10am
IARSAF Address	Olukunle Bashir IARSAF President	10:10am – 10:20am
Keynote Address 1: “Innovative Approaches Towards Equitable Access and Adoption of Climate-Smart Agriculture for Food and Nutritional Security”	Dr. Swati Nayak Lead- Seed systems and Product Management, IRRI	10:20am – 10:50am
Questions & Answers	All Participants	10:50am – 11:00am
Keynote Address 2: “How Innovative Research can aid in the Easy, Equitable Access and Adoption of Climate-Smart Agriculture for Food and Nutritional Security”	Dr. Godwin Aster Country Director for Africa, Sasakawa Africa Association	11:00am – 11:30am
Questions & Answers	All Participants	11:30am – 11:40am
Tea Break/Networking	All Participants	11:40am – 12:00pm
From the Alumni Network	All Participants	12:00pm – 12:30pm
Keynote Address 3: “Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security”	Prof. Charity Aremu Former Vice Chancellor, Landmark University	12:30pm - 01:00pm
Questions & Answers	All Participants	01:00pm – 01:10pm
Lunch	All Participants	01:10pm– 02:00pm

Keynote Address 4: “The Role of Gender in the Inclusive Adoption of Climate-Smart Agriculture to Drive Food and Nutritional Security”	Dr. Olajumoke Adeyeye Postdoctoral Fellow (Gender Research)	02:00pm – 02:30pm
Questions & Answers	All Participants	02:30pm – 02:40pm
Mentorship Moments	All Participants	02:40pm-3:20pm
Presentation by IITA Genetic Resource Center	Dr. Olaniyi Oyatomi Post-doctoral Fellow Genetic Resources	03:20pm – 03:30pm
Questions & Answers	All Participants	03:30pm – 03:40pm
Presentation by IITA Bioscience Centre	Mrs. Yemi Fajire Bioscience Manager	03:40pm – 03:50pm
Questions & Answers	All participants	03:50pm – 04:00pm
Presentation by Inqaba Biotec, West Africa	Mr. Olabode Omotosho Molecular Diagnostics Portfolio Manager	04:00pm – 04:10pm
Questions & Answers	All Participants	04:10pm – 04:20pm
Wrap Up and Announcements	Moderator	04:20pm - 04:30pm



International Association of Research Scholars and Fellows (IARSAF)

International Institute of Tropical Agriculture (IITA)

26TH ANNUAL SYMPOSIUM (27th - 30th November, 2023)

Theme: Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security

PROGRAM OF EVENTS

DAY 2: NOVEMBER 28, 2023

EVENT	FACILITATOR	TIME
Login/Arrival of Guests		08:45 – 09:00am
Opening	Adenike Dada and Andrew Aladele Moderators	09:00am – 09:05am
1st Technical Session: Lead Paper Presentation on Crop Production and Plant Breeding	Dr. Atanda Oladejo Senior Lecturer, Department of Crop Production and Protection, Obafemi Awolowo University, Ile-Ife, Osun State.	09:05am – 09:35am
Questions and Answers	All Participants	09:35am – 09:45am
Plenary Session	Akpojotor Ufuoma Editor-In-Chief	09:45am – 09:55am
Oral/Poster Presentations on Crop Production and Plant Breeding	Plenary Chairperson: Dr. Atanda Oladejo Rapporteur: Mary Edhemuino	9:55am – 10:55am
ORAL PRESENTATION		
Variability studies for agronomic and anti-nutritional traits in AYB germplasm Ebiti, E. K., Department of Crop and Horticultural Sciences, University of Ibadan.		

Assessment of variability in seedling vigour characteristics in fifteen (15) bambara groundnut (*Vigna subterranea* L.) Verdc) genotypes

Adaraloye, M. A., *Department of Plant Breeding and Seed Technology, Federal University of Agriculture, Abeokuta.*

Impacts of natural growth regulators on germination rate, growth and development of kola species

Muraina, D. O., *Department of Crop Protection and Environmental Biology, University of Ibadan, Nigeria*

Intercharacter association and path analysis of yield-related traits in some open-pollinated maize varieties

Odumuyiwa, O. E., *Department of Plant Breeding and Seed Technology, Federal University of Agriculture, Abeokuta*

Genetic Analysis of Root Nodulation in Cowpea (*Vigna unguiculata* [L.] Walp.)

Abdullahi, W.M., *Department of Plant Science, Faculty of Agriculture/Institute for Agricultural Research, Ahmadu Bello University, Zaria, Nigeria*

The Effects of Different Rates of Pre-Emergence Herbicide on Weed Species Composition, Growth and Yield in Maize/Cassava Intercrop

Adeniyani O. D.,

Effects of Intercropping and Integrated Soil Fertility Management on the Growth, Seed Yield and Nitrogen Fixation of Soybean.

Olusakin, S. G., *Department of Crop Production and Soil Science, PMB 4000, Ladoko Akintola University of Technology, Ogbomoso, Nigeria*

Evaluation of maize (*Zea mays* L.) varieties under low and optimum nitrogen fertilization in Ogbomoso

Ujah Godswill, *Crop Production and Soil Science Department, Ladoko Akintola University of Technology PMB 4000, Ogbomoso, Nigeria*

Performance of tomato accessions for yield, quality and adaptability to humid environments

Raji I. A., *Crop Production and Soil Science Department, Ladoko Akintola University of Technology, Ogbomoso, Nigeria*

Comparison of some winged bean and African yam bean accessions for seed yield

Akpojotor U. L., *Obafemi Awolowo University, Ile-Ife, Osun state, Nigeria.*

Bulking rate of cassava (*Manihot esculenta* crantz) for root yield at different harvest periods

Olukunle Bashir, *Cassava breeding unit, International Institute of Tropical Agriculture (IITA), P.M.B 5320, Ibadan, Nigeria.*

POSTER PRESENTATION**Soil baseline of Igbotako and Ode-aye towns in Okitipupa LGA of Ondo State, Nigeria, to determine efficiency for increased cassava production**

Alex O. C., *Farming System Research Programme (FSRP), National Root Crops Research Institute (NRCRI), Umudike, Nigeria*

Potentials of Artificial Intelligence (AI) tools for weed management to achieve high yield of maize (*Zea mays* L.)

Murtadha, M.A., *Department of Agronomy, Faculty of Agricultural Production and Management, College of Agriculture, Osun State University*

Film Show:	All Participants	10:55am – 11:20am
State of Food Security and Nutrition in the World 2023 by FAO	All Participants	10:55am – 11: 00am
Role of IITA in Tackling Food Insecurity and Malnutrition in Africa	All Participants	11:00am- 11:10am
Discussion: What is your role?	Moderators	11:10am – 11:20am
Tea Break/Networking	All Participants	11:20am – 11:40am
2nd Technical Session: Crop Biotechnology and Genetic Improvement	Dr. Melaku Gedil Molecular Geneticist/Molecular breeder, Bioscience center, IITA	11:40am – 12:10pm
Oral/Poster presentations on Crop Biotechnology and Genetic Improvement	Plenary Chairperson: Dr. Melaku Gedil Rapporteur: Ouattara Fatoumata	12:10pm – 01:10pm

ORAL PRESENTATION**Genomic prediction of yield traits among IITA cassava collections**

Olutegbe A. O., *International Institute of Tropical Agriculture*

Deconstructed East African Cassava Mosaic Virus (EACMV) can transiently deliver genes into different plant species

Okech, R. H., *International Institute of Tropical Agriculture (IITA), Nairobi, Kenya*

Characterization of early-maturing cowpea (*Vigna unguiculata* (L.) Walp.) germplasms through association analysis.

Iduh Michael Ogbeche, *Department of Plant Breeding and Seed Science, Joseph Sarwuan Tarka University Makurdi, Nigeria*

Seasonal dynamics of photosynthetic efficiency and yields among four accessions of *Sphenostylis stenocarpa* (Hochst. Ex A. Rich.) Harms.

Akeem Nofiu, *Crop Protection and Environmental Biology, University of Ibadan, Ibadan, Nigeria.*

POSTER PRESENTATION

Induced genetic variation in pepper (*Capsicum annum* L.) using caffeine

Ayopo B., A., *Genetic Resources Centre, International Institute of Tropical Agriculture, Ibadan*

Lunch	All Participants	01:10pm – 02:00pm
3rd Technical Session: Lead Paper Presentation: Food Science and Nutrition	Dr. Awoyale Wasiu Senior Lecturer, Department of Food Science and Technology, Kwara State University, Malete, Nigeria	02:00pm – 02:30pm
Oral/Poster Presentations on Food Science and Nutrition	Plenary Chairman: Dr. Awoyale Wasiu Rapporteur: Olaoye Dorcas	02:30pm – 03:30pm

ORAL PRESENTATION

Influence of cassava varieties on the textural attributes and consumer acceptability of Amala Lafun

Awoyale Wasiu., *Kwara State University (KWASU)*

Effects of drying methods on nutritional contents of three varieties of mango chips (*Mangifera Indica* L.)

Abdullahi, D. M. K., *Nigeria Customs Service, Customs House, Katsina, Katsina State, Nigeria.*

Effect of fermentation period on nutritional composition, antinutritional factors, and sensory attributes of cassava-orange flesh sweet potato pupuru

Oladimeji, T.E., *Department of Food Science, Ladoke Akintola University of Technology, Ogbomoso, Oyo State, Nigeria.*

Assessment of Multiple Antibiotic Resistance Index (Mari) of pathogens isolated from ready-to-eat fruits sold in Abakaliki.

Isirue, Abel M.C., *Department of Microbiology, Alex Ekwueme Federal University, Ndufu–Alike, Ikwo.*

Nutritional evaluation of biscuits produced from sweet potato, unripe plantain, and mushroom flour blends

Babalola, J. O., <i>Department of Food Science Technology, The Oke – Ogun Polytechnic, Saki, Oyo State, Nigeria.</i>		
Evaluation of boiled cassava root mealiness and its consumer acceptability using 9-point hedonic, JAR and CATA test Osunbade A. O., <i>International Institute of Tropical Agriculture (IITA), Ibadan</i>		
POSTER PRESENTATION		
Nutritional review of corn (<i>Zea mays</i> L.), cocoyam (<i>Colocasia esculenta</i> (L.) Schott), and rice (<i>Oryza sativa</i> L.) for a balanced diet Iyanda O. J., <i>Department of Agricultural Sciences, Afe Babalola University, Ado-Ekiti, Ekiti State, Nigeria</i>		
3 Minutes Thesis Pitch Competition	Registered Participants	03:30pm – 03:50pm
4th Technical Session: Data Science	Fowobaje Kayode Biometricians, IITA	03:50pm – 04:20pm
Questions & Answers	All Participants	04:20pm - 04:30pm
Wrap Up and Announcements	Moderator	04:30pm – 04:40pm



International Association of Research Scholars and Fellows (IARSAF)

International Institute of Tropical Agriculture (IITA)

26TH ANNUAL SYMPOSIUM (27th - 30th November, 2023)

Theme: Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security

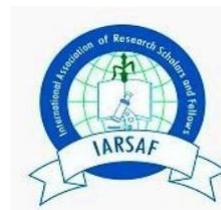
PROGRAM OF EVENTS

DAY 3: NOVEMBER 29, 2023

EVENT	FACILITATOR	TIME
Opening	Ibrahim Lydia and Olaleye Victor Moderators	09:00am – 09:05am
4 th Technical Session: Lead Paper Presentation on Plant Health and Entomology	Dr Lava Kumar Head of Germplasm Health Unit/Virologist	09:05am – 09:35am
Oral/Poster Presentations on Plant Health and Entomology	Plenary Chairperson: Dr Lava Kumar Rapporteur: Ayeni Beulah	09:35am – 10:35am
Questions and Answers	All Participants	10:35am – 10:45am
ORAL PRESENTATION		
<p>Influence of fertilizers and herbicides on aflatoxin concentration in sesame grains across some selected states in Nigeria Isienyi N. C., <i>Department of Crop Protection and Environmental Biology, University of Ibadan, Ibadan, Nigeria</i></p>		
<p>Understanding the factors influencing seed transmission of bean common mosaic virus (BCMV) in cowpea (<i>Vigna unguiculata</i> L. Walp.) Dauda Nathaniel, <i>Virology and Molecular Diagnostic Unit, International Institute of Tropical Agriculture, Oyo, Nigeria</i></p>		

<p>Insect Conservation as a Tool for Food and Nutritional Security Umoren, O.D., <i>Department of Biological Sciences, National Open University of Nigeria, Abuja, Nigeria</i></p>		
<p>POSTAL PRESENTATION</p> <p>Combating fall armyworm (<i>Spodoptera frugiperda</i>): strategies for sustainable agriculture and food security in Nigeria Eefa E. B., <i>Department of Crop Science, University of Calabar, Cross River State, Nigeria</i></p>		
Tea Break/Networking	All Participants	10:45am – 11:05am
5 th Technical Session: Lead Paper presentation on Agro-business and social science	Prof. Janice Olawoye Professor, Rural Sociology	11:05am – 11:35am
Oral/Poster Presentations on Agro-business and social science	Plenary Chairperson: Prof. Janice Olawoye Rapporteur: Ogechi Ihuoma	11:35am – 12:35am
<p>ORAL PRESENTATION</p> <p>Productivity of small and medium scale agricultural and related industries in Nigeria Abegunde T. M., <i>Ladoke Akintola University of Technology, Ogbomoso</i></p>		
<p>Potential adoption of hydroponics fodder production among Fulani pastoralists in Ogun state, Nigeria Olayemi M. O., <i>Department of Agricultural Extension and Rural Development, Federal University of Agriculture Abeokuta</i></p>		
<p>Promoting the role of agricultural extension in the adoption of climate-smart agriculture among root and tuber crop farmers in Nigeria Nwaekpe J.O., <i>National Root Crops Research Institute, Umudike, Abia State</i></p>		
<p>Assessing climate change adaptation strategies and determinants among smallholder maize farmers in southwestern Nigeria Seun Boluwatife AJALA, <i>Department of Forest Economics and Wood Industry, Czech University of Life Sciences, Prague, Czech Republic</i></p>		
<p>POSTER PRESENTATION</p> <p>Leveraging digital possibilities in extension service delivery for enhanced climate-smart agriculture adoption by smallholder farmers in Nigeria Ogunfolaju M. O., <i>Department of Agricultural Extension and Rural Development, Landmark University, Omu Aran, Nigeria</i></p>		
<p>Assessment of climate information needs among farmers in Southwest Nigeria Oyedepo E. O., <i>Department of Economics, Faculty of Humanities, Management and Social Sciences, Augustine University, Ilara – Epe, Lagos State, Nigeria</i></p>		

Nigeria's sustainable agriculture and food security nexus: The vital contribution of extension agents Aworinde K. B., <i>University of Ibadan, Nigeria</i>		
Asset accumulation: Best economic welfare index for assessment of commercialization among Farmers in developing countries Oluwarotimi O. F., <i>Agriculture Department, Wesley University Ondo.</i>		
NATURAL RESOURCES MANAGEMENT ORAL PRESENTATION		
Innovative solutions to reduce gas flaring for sustainable agriculture Olumayowa Joseph IYANDA, <i>Department of Agricultural Sciences, Afe Babalola University Ado-Ekiti, Ekiti State, Nigeria</i>		
Sainte-Marie's mangrove evolution between 2016-2020 (Madagascar) Zafiarisoa Theresa AGATHE, <i>Institut Supérieur de Sciences, Environnement et Développement durable, University of Toamasina-Madagascar</i>		
Lunch	All Participants	12:35pm – 01:25pm
Soap Box	All Participants	01:25pm – 01:50pm
High Plenary discussion	Akpojotor Ufuoma	01:50pm – 02:20pm
Market Square	Moderator	02:20pm – 02:50pm
Presentation of Winners for the 3 Minutes Thesis Competition	Zaina Soire Head, Capacity Development Office	02:50pm – 03:00pm
Vote of Thanks	Odor Celestine Chairman LOC	03:00pm – 03:10pm
Group Pictures	All Participants	03:10pm - 03:25pm
Wrap Up and Announcements	Moderator	03:25pm - 03:30pm



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International Institute of Tropical Agriculture (IITA)

26TH ANNUAL SYMPOSIUM (27th - 30th November, 2023)

Theme: Delivering Innovative Research Towards Inclusive Adoption of Climate-Smart Agriculture for Food and Nutritional Security

PROGRAM OF EVENTS

DAY 4: NOVEMBER 30, 2023

EVENT	FACILITATOR	TIME
Arrival of Guests	All Participants	09:30am – 10:00am
IITA HQ Tour	All Participants	10:00pm – 02:00pm
Red Carpet	All Participants	5:30pm – 06:00pm
Opening	Dada Adenike, Olaleye Victor Moderator	06:00pm
Welcome Address	Oduori Celestine Chairman LOC	06:00pm – 06:15pm
Introduction of Guests and High Table	Dada Adenike, Olaleye Victor Moderator	06:15pm – 06:25pm
Presentation of Awards	Awardees	06:25pm – 06:50pm
Games	Dada Adenike, Olaleye Victor Moderator	06.50pm – 07.10pm
Special Thanks/ Closing of program	Oduori Celestine Chairman LOC	07:10pm – 07:15pm
Refreshments	All Participants	07:15pm – 08:00pm
Dance! Dance!! Dance!!!	All Participants	08:00pm

ANNEX 3

NOTES ON KEYNOTE SPEAKERS AND PLENNARY CHAIR

Keynote Speakers	Dr. Swati Nayak Lead- Seed systems and Product Management, IRRI
	Dr. Godwin Aster Country Director for Africa, Sasakawa Africa Association
	Prof. Charity Aremu Former Vice Chancellor, Landmark University
	Dr. Olajumoke Adeyeye Postdoctoral Fellow (Gender Research)
Plenary Chairperson	Dr. Beatrice Aighewi Seed System Specialist, IITA
	Dr. Melaku Gedil Molecular Geneticist/Molecular breeder, Bioscience center, IITA
	Dr. Awoyale Wasiu Senior Lecturer, Department of Food Science and Technology, Kwara State University, Malete, Nigeria
	Fowobaje Kayode Biometrics Unit, IITA.
	Dr Lava Kumar Head of Germplasm Health Unit/Virologist
	Prof. Janice Olawoye Professor, Rural Sociology.

ANNEX 4

IARSAF EXECUTIVE OFFICERS, 2023-2024

 <p>Olukunle Babatunde Bashir President</p>	<p>Cassava Breeding Unit, IITA West Africa/ Ph.D. Department of Plant breeding and seed Technology Federal University of Agriculture Abeokuta, Nigeria</p>
 <p>Oduori Celestine Vice President</p>	<p>Nematology Unit, IITA, East Africa/Ph.D. Department of Plant Science and Crop Protection. University of Nairobi, Kenya.</p>
 <p>Gumo Pius General Secretary</p>	<p>Agronomy Unit, IITA, East Africa/MSc. Department of Agricultural Science and Technology, Kenyatta University, Kenya.</p>



Akpojotor Ufuoma L.
Editor-in-Chief

Genetic Resources Center, IITA/West Africa/Ph.D.
Department of Crop Production and Protection,
Obafemi Awolowo University, Ile-Ife, Nigeria.



Akeem Oluwasegun Nofiu
Assistant General Secretary

Genetic Resources Center, IITA/West Africa/Ph.D.
Department of Crop Protection and Environmental
Biology
University of Ibadan, Ibadan, Nigeria.



Neo Jeremiah Mahula
Financial Secretary/ Treasurer

Maize Improvement, IITA/West Africa/MSc.
Department of Crop and Horticultural Sciences,
Pan African University Life and Earth Sciences
(Including Health and Agriculture)-PAULESI,
University of Ibadan, Ibadan, Nigeria.



Nwogwugwu Precious Amarachi
Welfare Secretary

Genetic Resources Center, IITA/West Africa/Ph.D.
Department of Plant breeding and seed Technology
Federal University of Agriculture Abeokuta,
Nigeria



Oke Funmilayo Adebukola
Public Relation Officer

Genetic Resources Center, IITA
Department of Crop and Horticultural Sciences,
University of Ibadan, Ibadan, Nigeria

ANNEX 5

MEMBERS OF SYMPOSIUM ORGANIZING COMMITTEE

LOC Chairperson

Oduori Celestine

Nematology Unit, IITA/East Africa
Department of Plant science and Crop Protection.
University of Nairobi, Kenya.

S/N	Name	Unit in IITA	University
EDITORIAL			
1	Akpojotor Ufuoma L.	Genetic Resources Center	Obafemi Awolowo University, Ile-Ife.
2	Olaoye Omotola Dorcas	Cassava Breeding Unit	West Africa Center for Crop Improvement
3	Aiyedun Priscila	Genetic Resources Center	University of Ibadan
4	Iyanda Lydia	Aflasaf/Pathology	University of Ibadan
5	Adenike Dada	Genetic Resources Center	University of Ibadan
6	Adebisi Ademola	Agronomy	University of Ibadan
7	Akeem Nofiu	Genetic Resources Center	University of Ibadan
8	Edhemino Mary	Genetic Resources Center	Pan African University, University of Ibadan.
9	Oyedele Oluwafemi	Agronomy	University of Ibadan
FUNDRAISING			
10	Olukunle Bashir	Cassava Breeding Unit	Federal University of Agriculture, Abeokuta
11	Akeem Oluwasegun Nofiu	Genetic Resources Center	University of Ibadan
12	Ayeni Beulah	Genetic Resources Center	University of Ibadan
WELFARE			
13	Nwogwugwu precious	Genetic Resources Center	Federal University of Agriculture, Abeokuta
14	Quadri Zainab	Genetic Resources Center	University of Ibadan
MEDIA			
15	Oke Funmilayo	Genetic Resources Center	University of Ibadan
16	Jamiu Jimoh Muhammed	Bioscience Center	University of Ibadan
17	Aladele Andrew	Genetic Resources Center	Covenant University
18	Olalekan Kolawole	Cassava Breeding unit	University of Ibadan

PROTOCOL			
19	Neo Jeremiah Mahula	Maize improvement Program	Pan African University, University of Ibadan
20	Moise Hubert BYIRINGIRO	Genetic Resources Center	Pan African University, University of Ibadan
21	Joy Jesumed OLADIMEJI	Bioscience centre	Pan African University, University of Ibadan
22	Alade Temiloluwa Rebecca	Prossiva	Pan African University, University of Ibadan

ABOUT IITA BIOSCIENCE CENTER

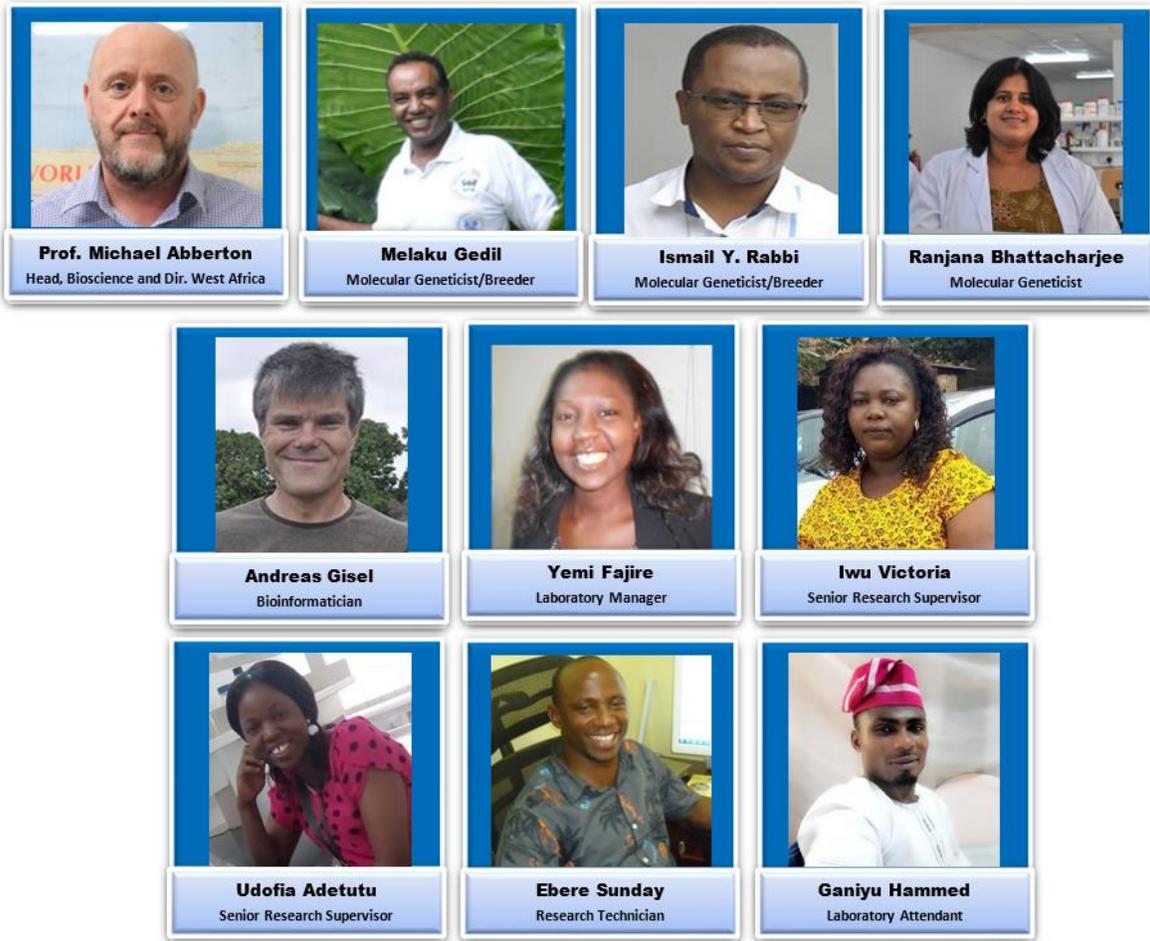
The IITA Bioscience Center is one of the earliest and few centers of excellence for genomics and biotechnology in sub-Saharan Africa. Our research activities include molecular breeding, molecular characterization, cytogenetic analysis, pathogen diagnostics, QTL mapping, to mention but a few. One of the key components of our work is the capacity building for researchers and graduate students from research institutes and universities through group and individual training to address the myriad of problems confronting NAR partners in the field of biotechnology in sub-Saharan Africa. Several universities and research institutes have benefited from our comprehensive training, adequate infrastructure, and expertise in biotechnology. We offer custom-made training in molecular biology techniques, DNA sequencing, and bioinformatics. Our excellent facilities are open to researchers from various universities and institutions to carry out quality biotechnology research.

The unit has strong partnerships with advanced research institutions in Europe, America, and Australia, where we access advanced technologies such as next-generation sequencing, RNAseq, microarrays, and high throughput SNP genotyping such as Illumina's Golden Gate Assay.

We offer high-quality genotyping services and cytogenetic analysis to researchers and partners in sub-Saharan Africa. These include: Gene Sequencing, Nucleic Acid Isolation, Polymerase Chain Reaction, Real-Time PCR Analysis, Ploidy Analysis, DNA Fragment Analysis, and Bioinformatics.

The Center is headed by the Director of West Africa, Prof. Michael Abberton. There are also scientists with vast knowledge and core staff who are highly experienced in providing services to both internal and external lab users and are involved in the day-to-day management of the facilities to ensure smooth and uninterrupted operations at all times.

Bioscience core staff and scientists:



ABOUT IITA GENETIC RESOURCE CENTER

Genetic Resources Center (GRC) of the International Institute of Tropical Agriculture, conserve diverse germplasm of over 35,000 accessions of African food crops including the world's largest collection of cowpea and their wild relatives. The collection also includes: clonal crops such cassava, yams, plantain, banana and many important underutilized legumes The collection is being held in trust on behalf the Food and Agriculture Organization of the UN (FAO). These diverse collections are conserved and made available for use globally and in perpetuity for the benefit mankind.

The center focuses on the use of both genomic and agro-morphological tools to explore the potentials of plant collections with specific focus on identifying beneficial alleles for climate adaptation, this includes analysis of variation in key traits including drought tolerance, yield, cooking time, nutritional properties, and N fixation.



Inqaba Biotec

Inqaba Biotec is Africa's foremost genomics company, which was established in 2002 from an idea that was conceptualized in 2000. Headquartered in South Africa with subsidiaries and presence in West, East and Central African countries.

For over 20 years, the company has provided quality laboratory products and services to the scientific community, and as a result, Inqaba Biotec has grown to be a household name in the life science industry and research laboratories across sub-Saharan Africa.

To date, the West Africa subsidiary (IBWA) has organized several workshops and trained thousands of scientists in molecular biology techniques, bioinformatics and phylogenetic analysis. The company is made up of young, energetic and professional individuals all working towards the same mission: to facilitate life science research in Africa by making it possible for researchers in the region to be on par with their counterparts in other parts of the world.

