International Association of Research Scholars and Fellows

IARSAF 28TH ANNUAL SYMPOSIUM

Book of Abstracts

Theme:

"Science and Systems Thinking: Driving Climate Resilience and Nutrition Transformation in African Food Systems"

28th-31st October, 2025

BOOK OF ABSTRACTS FOR THE 28TH ANNUAL SYMPOSIUM OF THE INTERNATIONAL ASSOCIATION OF RESEARCH SCHOLARS AND FELLOWS (IARSAF)

SCIENCE AND SYSTEMS THINKING: DRIVING CLIMATE RESILIENCE AND NUTRITION TRANSFORMATION IN FOOD SYSTEMS

Hybrid conference format (Conference Centre, IITA Ibadan; Vivarium Hall, icipe, Nairobi; and Zoom), from 28th to 31st October 2025.

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ISBN: 978-978-131-434-6

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Citation:
International Association of Research Scholars and Fellows (IARSAF). (2026). *Science and systems thinking: Driving climate resilience and nutrition transformation in African food systems*. Ayoola, A. S., Akpojotor, U. L., Diekade, V. A., Akanfe, N. M., Nofiu, A. O., Ihuoma, O., Abiola, M., Adesina, T., & Olaoye, O. D. (Eds.). Book of abstracts of the 28th Annual Symposium, 28–31 October 2025, IITA, Ibadan, Nigeria.

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FOREWORD

The theme of the International Association of Research Scholars and Fellows (IARSAF) 28th Annual Symposium is *Science and Systems Thinking: Driving Climate Resilience and Nutrition Transformation in African Food Systems.* This theme developed from the immediate need for a comprehensive approach to the problems of Climate Change, Food Insecurity, and Malnutrition in Africa through Science and Systems Thinking.

The Book of Abstracts contains contributions by scholars, practitioners, and young scholars in different disciplines who have presented research, review papers, and innovation. These contributions exemplify the importance of science, policy, technology, and collaboration in building the resilience and sustainability of Africa's food systems.

IARSAF continues to show dedication to improving scholarly excellence, interdisciplinary engagements, and capacity-building among researchers and professionals. This symposium serves as an avenue for interaction, connectivity, and dissemination of research-informed interventions that can enhance climate resilience and nutrition outcomes.

On behalf of the Association, I would like to thank all authors, reviewers, organizers, and partners who contributed to the existence of this book and the Symposium. Let me also thank the Editorial and Organizing Committees who painstakingly produced this Book of Abstracts.

I hope that the concepts, ideas, and findings shared in this work will trigger informed dialogue, which can fuel transformative actions in African food systems, as well as other parts of the globe.

Yours Faithfully
Ayooluwa S. Ayoola
Editor-in-Chief
International Association of Research Scholars and Fellows (IARSAF)

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Taiwo Adesina	Associate Editor (Compilation & Review)

Acknowledgement:

The Editorial Crew sincerely appreciates the contributions of all authors, reviewers, and members of the Organizing Committee. Their dedication and support have been invaluable in compiling this Book of Abstracts and ensuring the success of the 28th Annual Symposium of the International Association of Research Scholars and Fellows (IARSAF).

EDITOR'S NOTE

As the Editor-in-Chief, it has been a privilege to oversee the compilation of this Book of Abstracts for the 28th Annual Symposium of the International Association of Research Scholars and Fellows (IARSAF). This edition brings together a diverse collection of research contributions that reflect the innovative approaches and rigorous scholarship of our members.

Compiling the abstracts was both challenging and rewarding, and it is my hope that this publication serves as a valuable resource for researchers, practitioners, and policymakers engaged in advancing climate resilience and nutrition transformation in African food systems.

I extend my sincere gratitude to the Associate Editors, technical staff, authors, and the Organizing Committee for their dedication and commitment in making this volume possible.

Ayooluwa S. Ayoola
Editor-in-Chief

PREFACE

Dear esteemed scholars, researchers, practitioners, mentors, and valued partners,

It is with great pleasure and a profound sense of fulfillment that I present this Book of Abstracts of the 28th Annual IARSAF Symposium. This volume brings together the diverse scientific contributions, innovative ideas, and collaborative efforts that characterized this year's symposium and reflects the shared commitment of young scientists to advancing agricultural research, climate resilience, and nutrition transformation in African food systems.

The 28th IARSAF Symposium was a hybrid event at IITA-Ibadan, Nigeria and IITA-icipe, Kenya convened under the theme "Science and Systems Thinking: Driving Climate Resilience and Nutrition Transformation in African Food Systems." This theme responds to the growing complexity of challenges facing agriculture in Africa, including climate variability, environmental degradation, and persistent malnutrition. By embracing systems thinking and integrated scientific approaches, the symposium provided a platform for exploring holistic solutions that link climate resilience, sustainable production, and improved nutrition outcomes.

Throughout the symposium, participants engaged in rich scientific discourse, shared cutting-edge research, and challenged conventional approaches to agricultural development. The abstracts compiled in this book highlight interdisciplinary perspectives and innovative methodologies aimed at strengthening food systems that are resilient, inclusive, and nutrition-sensitive. Collectively, these contributions underscore the importance of collaboration across disciplines, institutions, and regions in driving meaningful and lasting impact.

We were privileged to benefit from the insights and guidance of our distinguished speakers and mentors, whose expertise and commitment continue to inspire early-career researchers. Their engagement reinforced the vital role of mentorship in nurturing the next generation of scientists and leaders in agricultural transformation.

I extend my sincere appreciation to the International Institute of Tropical Agriculture (IITA) management and staff, including the Director General, Dr. Simeon Ehui, Deputy Directors General DDG R4D, Dr. Bernard Vanlauwe and DDG P4D Dr. Tahirou Abdoulaye, hub representatives especially Prof. Michael Abberton (West Africa) and Dr. Leena Tripathi (Eastern Africa), and the head of Capacity Development Office, Ms. Zaina Sore and Mrs. Mary Badejo as well as the teams from IT, communications, and administration, for their unwavering support. Special thanks are also extended to IITA Kenya especially Ms. Rachel Zozo, Ms. Babra Sehlule and Ms. Linda Barasa and IITA-Nigeria and its dedicated staff for their logistical and institutional contributions. Special thanks also to IITA student supervisors for their support in the success of this symposium.

We are equally grateful to our partners and sponsors, particularly *icipe* particularly Dr. Abdou Tenkouano, Director General, Dr. Everlyn Nguku, Head of the Capacity Building and Institutional Development (CBID) Platform, Dr. Liz Ng'ang'a, Head of Communications and, *icipe* Scholars Association (ISCA) through their president, Amin Mustapha and all the ISCA executive members, whose support reflects a strong commitment to capacity building and scientific excellence among young researchers.

A special word of recognition goes to the IARSAF leadership and the symposium planning committee for their dedication, teamwork, and tireless efforts in ensuring the success of this event. Their collective commitment transformed the symposium into a vibrant space for learning, networking, and shared vision.

As readers engage with this Book of Abstracts, we hope the ideas and findings presented herein will stimulate further dialogue, foster new collaborations, and inspire research that drives climate resilience and nutrition transformation across African food systems. May this volume serve not only as a record of the 28th IARSAF Symposium but also as a catalyst for continued innovation, systems-based thinking, and impactful science.

To all young scientists, particularly women in science, may this work serve as a reminder that your voices, ideas, and contributions are essential to shaping resilient and sustainable food systems for the future.

Thank you for being part of the 28th IARSAF Symposium and for contributing to its success.

Best regards,
Emily Anyango Ong'ondo,
Vice President IARSAF, 2025

PRESIDENT'S WELCOME ADDRESS

SCIENCE AND SYSTEMS THINKING: DRIVING CLIMATE-RESILIENT AND NUTRITION TRANSFORMATION IN AFRICAN FOOD SYSTEMS

Distinguished Guests, Esteemed Colleagues, Ladies and Gentlemen, it is with great joy and honour that I welcome you to the 28th Annual Symposium of the International Association of Research Scholars and Fellows (IARSAF). On behalf of the Executive Committee, the Local Organizing Committee (LOC), and the entire IARSAF community, I warmly greet all participants joining us physically and virtually from across the continent and beyond.

This year's theme, *"Science and Systems Thinking: Driving Climate-Resilient and Nutrition Transformation in African Food Systems,"* speaks directly to the urgent challenges and tremendous opportunities that define our time.

Africa stands at a pivotal moment. Our food systems are increasingly pressured by climate change, population growth, conflict, and socio-economic inequality. Yet, within these challenges lies the potential for profound transformation if we harness the power of science, systems thinking, and collective action.

This theme challenges us to move beyond siloed approaches. It calls on researchers, policymakers, practitioners, and thought leaders to embrace holistic thinking, integrate diverse perspectives, and design resilient solutions that are locally grounded yet globally informed. As scholars and fellows, we are uniquely positioned to lead this transformation. Our research must not only generate knowledge but also inspire action; action that uplifts communities, informs policy, empowers farmers, and ensures sustainable access to safe, nutritious food for all.

This year, we are especially proud to host the symposium in a hybrid format, with physical gatherings at our headquarters and in Nairobi, Kenya, bringing together scholars from Ibadan, Nairobi, and beyond. This approach, a legacy initiated by the previous administration exemplifies our continued commitment to inclusivity, accessibility, and meaningful cross-border collaboration.

Highlights and Achievements of the Past Year

1. Capacity Development and Member Engagement

Over the past year, we have strengthened our capacity-building initiatives through training sessions and workshops, including reference management with Mendeley; hands-on molecular techniques; Genome-Wide Association Studies (GWAS); mental health and stress management; and mentorship sessions with seasoned scientists. We also successfully held the maiden edition of the

IARSAF × *Alumni* networking session and facilitated members' participation in the NPBA Conference, among other initiatives.

2. Scholarships, Fellowships, and Awards

Our members continue to excel globally. Notable achievements include:

- Dorcas Omotola Olaoye – Norman Borlaug Scholar Fellowship (one of only six Africans selected)
- Dr. Ufuoma Akpojotor, Ruth Oluwasegun and Rose Harriet – AWARD Fellowship
- Omoboluwape Mary Diekade – Invited speaker at the African Food Systems Forum (Senegal) and at the APBA Conference (Zimbabwe)
- Adepeju Mubarak – Swedish Institute Scholarship for Global Professionals
- Mary Modupe Omotosho – Best Oral Presentation Award at the ABM of APS
- Tina Ojuederie – African Plant Genome Assembly and Annotation Fellowship
- Omotola Dorcas and Dr. Ufuoma Akpojotor – Genomics and Bioinformatics Data Hackathon & sponsorship to the APBA Conference
- Olubunmi Akomolede – Fully funded scholarship at the Sainsbury Laboratory and the University of East Anglia
- Gift Gbaruko and Victor A. Diekade – Bayer Foundation Fellowship Awards

These accomplishments reflect our collective commitment to excellence in agricultural research and innovation.

3. Community Impact

Our members also contributed significantly to community outreach, including presentations at the Graduate Interns' Orientation Program (Capacity Development Office) and participation in youth-in-agriculture discussions on IITA Radio. To extend our impact beyond IITA, we introduced a Travel Grant initiative, by awarding ₦10,000 each to twelve external students based on the quality of their abstracts. This initiative strengthens our engagement with young researchers across institutions, promoting inclusivity and scientific growth.

At this juncture, I extend my heartfelt gratitude to the leadership of IITA; Dr. Simeon Ehui (DG), Dr. Tahirou Abdoulaye (DDG P4D), Dr. Bernard Vanlauwe (DDG R4D), Prof. Michael Abberton (Director, West Africa Hub), Dr. Leena Tripathi (Director, East Africa Hub), Mrs. Zainatou Sore (Head, Capacity Development Office), Mrs. Mary Badejo (IARSAF Coordinator), and the Communication, ICT, Security, and other supporting units. I also appreciate the management of icipe, Kenya especially DG Dr. Abdou Tenkouano; CBID Platform Head, Dr. Everlyn Nguku; the Communications Department led by Dr. Liz Ng'ang'a; and the IITA administrator, Linda Barasa for their invaluable support in the production of this book of abstracts.

Finally, I would like to express my sincere appreciation to the entire IARSAF editorial team, skillfully led by Mr. Ayooluwa Samuel Ayoola (Editor-in-Chief) for their commitment in putting this together.

As I conclude, I encourage every participant and reader to engage deeply with this Book of Abstracts. Within its pages lie innovative ideas, research breakthroughs, and interdisciplinary perspectives that speak directly to the challenges facing Africa's food systems. It is my hope that the knowledge shared here will inspire new collaborations and contribute meaningfully to the continent's efforts toward achieving climate-resilient and nutrition-secure food systems.

Diekade, Victor Adelodun
President, IARSAF 2025

PROFILES OF KEYNOTE SPEAKERS

Bolanle Omolara Otegbayo is a Lecturer at the Department of Food Science & Technology Bowen University, Iwo. She joined the services of Bowen University on 2nd September 2002 as an assistant Lecturer. She is currently a Professor of Food Science & Technology. She obtained a B.Sc. in Food Science and Technology from Obafemi Awolowo University (1993) and M.Sc. (1998) and Ph.D. degrees (2004) in Food Technology from the University of Ibadan.

She was the Head of Department of Food Science & Technology from 2013-2018, the pioneer Director of Research & Strategic Partnerships from 2018-2019, Vice-Provost of the College of Post graduate Studies from 201 and currently the Provost of College of Post graduate Studies (COPGS) of Bowen University.

As a Food Scientist, her area of specialization is Food Chemistry. Her study focused on identifying food quality variables in indigenous crops to improve their industrial and household consumption. She has vast experience working with root and tuber crops. Through her study, she has created methodologies and standard operating procedures for identifying food quality indicators inherent in yam tubers and can predict the quality of yam food products acceptable to end users. Yam breeders increasingly employ these as high-throughput approaches, resulting in a short yam breeding cycle. She has characterized over 500 yam cultivars for genotypic diversity in qualitative composition. These are baseline data to help select yam genotypes for specific end uses.

She has won several grants totaling about Nine hundred and fifty thousand dollars ($950,000) and many national and international awards. Notable amongst them are: IFAD grant for 'Characterization of some Nigerian yam land races in terms of their food quality in relation to their end use suitability', PEARLs II grant for 'Developing indicators for phenotyping Food quality traits in yam (*Dioscorea*)' (funded by Bill and Melinda Gates Foundation), 'Breeding Root, Tubers, Banana for end Users preferences' (funded by Bill and Melinda Gates Foundation) and 'Calcium enrichment of Local foods through Nixtamalized Maize' (funded by HarvestPlus/International Food Policy Research Institute, Washington, USA), 'Food Safety Research Project, to study household-level food safety risk and community capacity to monitor and mitigate foodborne illness in Nigeria' (funded by Food safety Innovation Lab (FSIL), Purdue University, USA) etc.

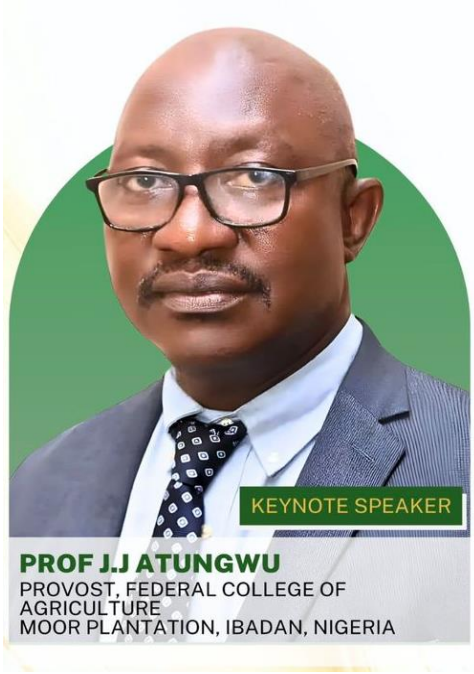
Bolanle Otegbayo is a recipient of the distinguished Postdoctoral Fellowship of African Women in Agricultural Research and Development (AWARD). She did her Postdoctoral training at CIRAD, Montpelier and INRA, Nantes, France in 2011 & 2012. She was the first AWARD fellow

to be hosted by Agropolis Foundation, France where she worked on the physicochemical, functional, and molecular characterization of yam starch for potential industrial use. She is a Fellow of Nigeria Institute of Food Technologists, Fellow African Academy of Science (FAAS), Fellow of Salzburg Global seminar, Austria, Fellow, African Nutrition Leadership Programme (ANLP) South Africa, Fellow, International Professional Managers, UK, Fellow Certified International Professional Managers, UK, Premier member, Institute of Food Technologist USA, member of Holland Alumni, Netherlands, member, Nigeria Women in Agriculture Research and Development (NIWARD), member International Union of Food Science & Technologists (IUFoST), member International Society for Root and Tuber Crops, African Branch (ISTRC-AB), International Society for Root and Tuber Crops, (ISTRC), member, organization for women in Science in developing world (OWSD) Member, Global Forum on Food Security and Nutrition (FSN Forum) and member, Expert Review Panel for Association of Official Analytical Chemists (AOAC) for Natural Toxin Methods (ERP) and a Certified Food Scientist (CFS) by International Food Science Certification Commission (IFSCC, USA) since 2013. Professor Bolanle Otegbayo is an inaugural member of the Doctoral Academy being hosted by Committee of Provosts, Deans and Directors of Post graduate Colleges in Nigeria where she was also one of their resource persons. She has served as a member and Chairman of Technical committees on Standards for various food products in Nigeria, and she is currently the Chairman for Meat, Poultry and related Products Committee of African Region Standards Organization (ARSO).

Professor Otegbayo has served and is still serving as a reviewer and associate editor to many reputable International Journals (Elsevier, Wiley etc.), Technical abstract reviewer for Institute of Food Technology (IFT, USA) annual meetings, a juror for selecting awardees for International Food Security Award (IFT, USA) and also a member of the Trend setting committee saddled with the responsibility of program planning for IFT annual meetings. She has attended many trainings, workshops, seminars, and conferences at both local and international levels. She has worked at both National (Institute of Agriculture Research and Training (IAR&T)) and International Agricultural Research Institutes (International Institute of Tropical Agriculture (IITA).

She is involved in mentoring colleagues both formally and informally; she has been an AWARD mentor three times and a mentor for the Strengthening Research Capacity in Nigeria Mentorship Program hosted by Nigerian Academy of Science.

She is happily married and blessed with Godly children.



Jonathan Jeremiah ATUNGWU is a Professor of Plant Nematology, currently the 9th Provost/ 28th Head of the 105 year-old Federal College of Agriculture, Moor Plantation, Ibadan, Oyo State.

He is a renowned expert in Organic Agriculture and biopesticides development. Atungwu is the Immediate Past Dean, College of Plant Science and Crop Production (COLPLANT) at the Federal University of Agriculture, Abeokuta (FUNAAB), & School of Agriculture, Lagos State University, Epe Campus. He is the incumbent Secretary of the Association of Deans of Agriculture in Nigeria Universities (ADAN).

Atungwu holds a Short Course Certificate in Sustainable Agriculture from Coventry University, UK, and attended an International Certificate program at China Agricultural University, Beijing. His research focus is non-chemical crop protection options for sustainable crop production. He has over 100 publications, including books, journal articles in reputable international and national outlets, as well as in peered reviewed conference proceedings.

Professionally, Atungwu is the Immediate Past President of the Nigerian Society for Plant Protection (NSPP), Chairman of the Board of Trustees of Network of Biopesticides and Phytomedical Stakeholders (NEBIPS), and Patron of the Nigerian Society of Permaculture (NISOP).

He is a fellow of the:
1) Nigerian Society for Plant Protection.
2) Graduate Research, IITA.
3) Carnegie African Diaspora, USA

Professor Jonathan Atungwu is an active member of the:

1. Nigerian Society of Nematologists
2. Agricultural Society of Nigeria.
3. Soybean Association of Nigeria.
4. Nigerian Society for Parasitology.
5. Organic Agriculture Practioners in Tertiary Institutions in Nigeria.
6. Nigerian Phytopathology Society.

At the international scene, he is a member of the Steering Committee of the West African Network on Organic Agriculture Research and Training, and the Biotic Constraints and Food Production Committee of the International Society for Plant Pathology.

He is a member of the International Society for Organic Agriculture (ISOFAR), as well International Society of Pesticidal Plants (ISPP).

Professor Jonathan Atungwu is a grantee of:

1. International Institute of Tropical Agriculture, Nigeria.
2. Food and Agricultural Organization, Rome.
3. MasterCard Foundation.
4. Tertiary Education Trust Fund, Nigeria.
5. Carnegie African Diaspora Fellowship Program, USA.

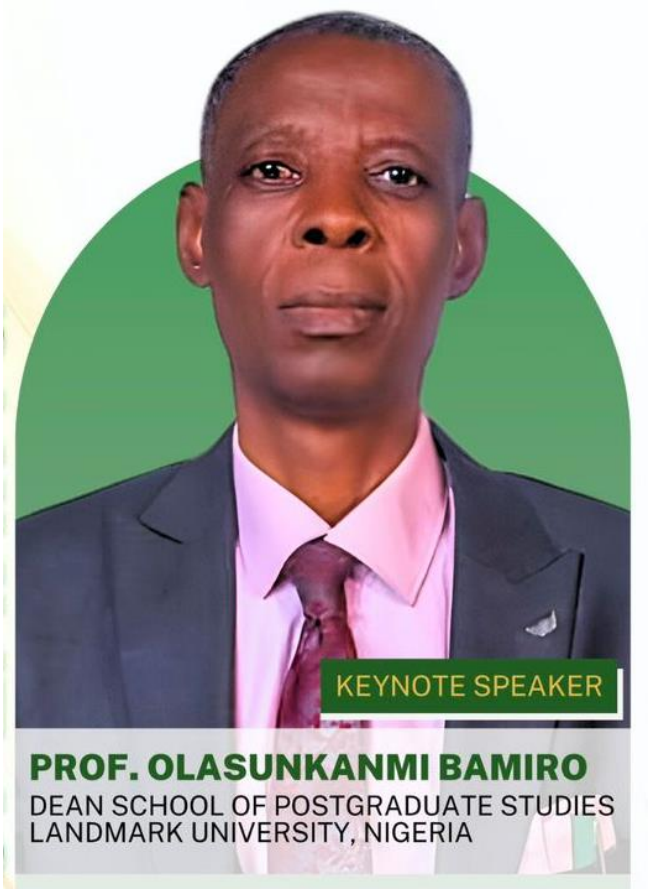
Since assumption of office as the 9th Provost and 28th Head of the Federal College of Agriculture, Moore Plantation, Ibadan, Oyo state. He has hit the ground running and was able to achieve the following feats to his credit.

- ❖ Completion of the Students loan (NELFUND)
- ❖ Establishment of various Directorates for effective and easy administration
- ❖ Robust relationship with various unions and students on campus
- ❖ Organizing in-House seminar for the Management staff, both Academic and non-Academic staff
- ❖ Unveiling draft of the College master plan
- ❖ Stakeholders and interactive meeting with newly appointed Board Chairman
- ❖ Promotion of sports and sporting activities
- ❖ Smooth running of academic activities
- ❖ Purchasing of two mowing machines so as to maintain neat and healthy environment
- ❖ Inauguration of College rules and regulations committee
- ❖ Inauguration of Servicom committee.

He is a renowned mentor for the upcoming agricultural scientists, teachers, agropreneurs, and youths.

Joe is a team player, demonstrated by his leadership of the College Accreditation Committee & the International Conference Committee.

To the glory of God, he is happily married to Faith and the union is blessed with very pleasant, hardworking, and disciplined children.



Professor Olasunkanmi Bamiro is a distinguished academic and renowned expert in the field of Agricultural Economics. He started his academic career at Ogun State University now known as Olabisi Onabanjo University. He is currently serving as a Professor at Landmark University; he has made significant contributions to both academia and the university community. With an exceptional track record, he has earned a reputation as an exemplary educator and leader.

Prof. Bamiro's dedication to teaching excellence and student impact is evident through his consecutive win of the Most Impactful Lecturer award for three years in his College. This recognition highlights his ability to engage and inspire students, making complex concepts accessible and relevant to their studies.

Recognizing his leadership abilities, Prof. Bamiro was entrusted with important administrative roles within Landmark University. He served as the Chairman of the University Examination committee for five years, ensuring the integrity and effectiveness of the examination process. Additionally, he held the position of Head of the Department of Agriculture for four years and subsequently served as the Dean of the College of Agriculture for three years. Currently, he is the Dean, School of Postgraduate Studies. These leadership positions demonstrate his commitment to academic management and fostering growth within the institution.

One of the highlights of Prof. Bamiro's career was the delivery of his inaugural lecture titled "Roadmap to Canaan: Production Efficiency and Integration in Agribusiness." This landmark event was graced by the Chancellor of Landmark University, Dr. David Oyedepo, showcasing the significance of Prof. Bamiro's scholarly contributions.

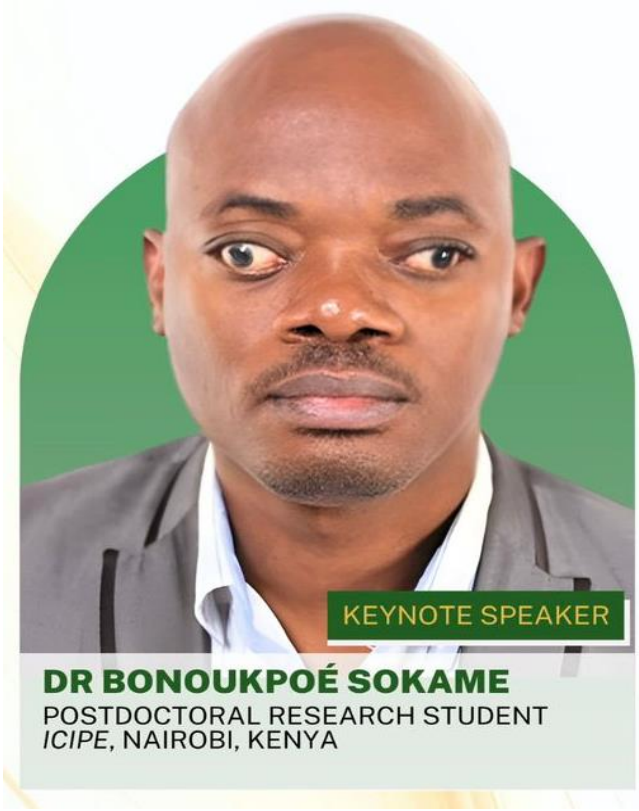
Prof. Bamiro's expertise extends beyond his administrative roles. He has actively contributed to the field of Agricultural Economics through his extensive research and publications. With over 50 publications in reputable journals, his work has helped advance knowledge and understanding in areas related to agribusiness, production efficiency, and integration. His research contributions have established him as a respected authority in his field.

He has supervised more than 100 undergraduate research project, 9 Master Students and 5 Ph.Ds

Beyond his academic pursuits, Prof. Bamiro is known for his innate drive in propagating the

Gospel. He is an adept teacher of the Word, sharing his faith and wisdom with others. His exceptional skills as a marriage counselor have positively impacted numerous couples, playing a crucial role in resolving conflicts and saving marriages.

Finally, Prof. Bamiro is driven by a deep desire to empower young people and youth to make a lasting impact and fulfill their potential through the provision of quality education. His passion for education clearly depicts his commitment to shaping the future generation and creating opportunities for growth and success.

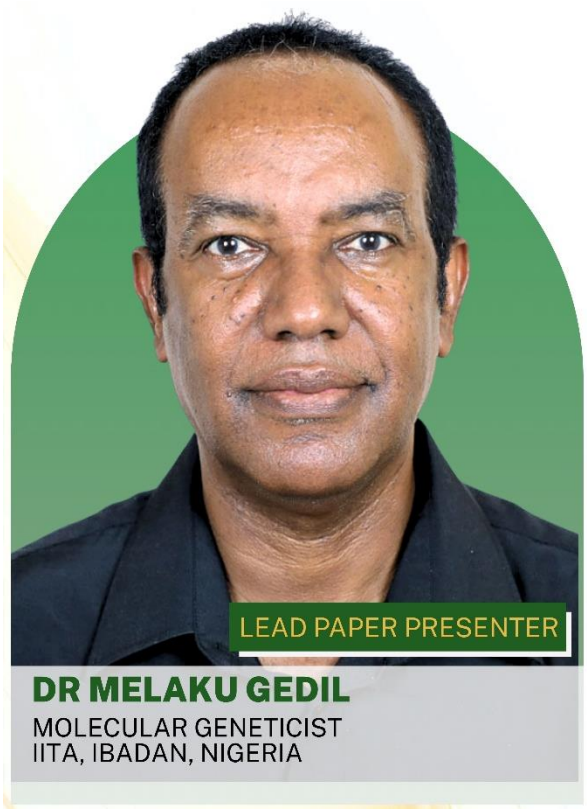


Dr. Bonoukpoè Mawuko Sokame is a Postdoctoral Research Scientist at the International Centre of Insect Physiology and Ecology (*icipe*) in Nairobi, Kenya. An agronomist by training, he holds a PhD in Crop Protection from the University of Nairobi and has over a decade of experience in climate-smart agriculture, integrated pest management, and system dynamics modelling. His research focuses on systems thinking and system dynamics modelling to address agricultural pests, climate change adaptation, and food security within a One Health framework.

Dr. Sokame has authored over 30 peer-reviewed publications and has led or contributed to international projects on invasive species management, phytosanitary capacity development, pest-crop-climate modelling, and climate-smart agriculture in collaboration with CGIAR centers, FAO, national research systems, and international partners. He has also played an active role in capacity building, mentoring graduate students, developing training modules, and strengthening farmer advisory services to enhance ecological literacy and adoption of sustainable practices.

Fluent in English and French, Dr. Sokame is committed to bridging science, policy, and practice by fostering cross-sectoral partnerships and evidence-based innovations. His vision is to contribute to the transformation of African food systems through climate-resilient, nutrition-sensitive, and environmentally sustainable approaches that benefit farmers, rural communities, and future generations.

PROFILES OF LEAD PAPER PRESENTERS



Melaku A Gedil (Ph.D.), currently a principal scientist, molecular geneticist, and molecular breeder at IITA, has over 22 years of post-PhD experience in cutting-edge research at IITA and academic institutions in the USA. Dr. Gedil's goal is to leverage his interdisciplinary background in plant breeding, statistical genetics, molecular biology, and bioinformatics to study and apply functional genomics techniques for developing efficient molecular breeding strategies. These strategies focus on pest and disease resistance, nutritional trait enhancement, and mitigation of abiotic stresses like drought. He is especially interested in implementing cost-effective, high-throughput genotyping methods suitable for developing countries. His current research centers on using functional genomics to develop effective molecular breeding programs for maize and cassava, as well as soybean, cowpea, and yams. My approaches include marker-assisted recurrent selection (MARS), genome-wide association studies (GWAS), genome selection (GS), linkage/QTL mapping, comparative genomics, and bioinformatics.

Dr. Gedil served as the Head of the Bioscience Center at IITA for over 8 years. He has authored and co-authored over a hundred and twenty publications in peer-reviewed, Thompson-indexed journals, including journal articles, book chapters, conference proceedings, and abstracts on various topics and crops. The impacts of my publications include ResearchGate Research Interest Score = **3049**; H-index = **36**; Citations = **4102;** and **60,292** reads. He has gained extensive experience supervising visiting scientists, postdoctoral fellows (>4), PhD students (>17), and MSc students (>15), and have served as a resource person in many workshops, graduate courses, and curriculum reviews at universities.

Dr. Elohor Mercy Diebiru-Ojo is a Seed Systems Specialist at the International Institute of Tropical Agriculture (IITA) and serves as the Vegetative Seed Specialist for IITA GoSeed**,** the seed business arm of the IITA Business Incubation Platform. She holds a B.Sc. in Crop Science from Delta State University Nigeria**,** an M.Sc. in Crop Protection and Environmental Biology from the University of Ibadan Nigeria**,** and a Ph.D. in Plant Breeding from the West Africa Centre for Crop Improvement (WACCI), University of Ghana, Legon.

Mercy's research focuses on Cassava Genetics, Physiology, Breeding, and Seed systems**.** During her Master's program, she worked extensively on Cassava Conservation using tissue culture and cryopreservation techniques. Her doctoral research advanced understanding of the Genetics and Physiology of cassava flowering**,** a key component of the NextGen Cassava Breeding Project. She received the Norman Borlaug LEAP Fellowship**,** conducting research as a visiting scientist at Cornell University, USA, and has presented her findings at numerous national and international conferences on plant breeding and seed systems. While undergoing her Masters and PhD programs she was a member of the International Association of Research Scholars and Fellows (IARSAF).

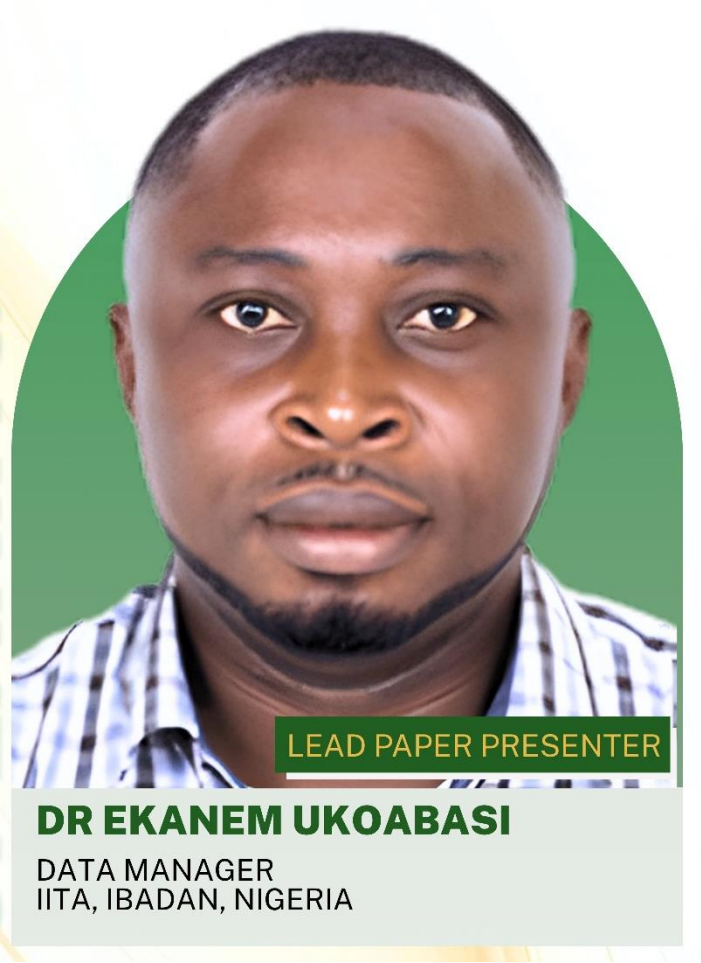
At IITA, Mercy has held several leadership roles, including International Trials Manager for the Cassava Breeding Unit under the Building a Sustainable Integrated Cassava Seed System (BASICS) project. In this role, she played a critical part in developing functional cassava seed systems in Nigeria and Tanzania**,** deploying efficient technologies and tools in both public and private sector. She also made significant contributions to the Yam Improvement for Incomes and Food Security in West Africa (YIIFSWA) project, where she developed and implemented commercialization models for early-generation yam seeds using innovative technologies.

Her impact spans multiple projects, including NextGen**,** HarvestPlus**,** GIZ**,** and the Technologies for African Agriculture Transformation (TAAT) program, where she is scaling the Semi-Autotrophic Hydroponics (SAH) Technology across Africa, a breakthrough that earned her the **2025 Africa Food Prize Award**.

Currently, Mercy leads the Development of Early Generation Seed Enterprises component of the BASICS-II project and heads the GoSeed yam component of the Program for Seed System Innovation for Vegetatively Propagated Crops in Africa (PROSSIVA) project. She also coordinates the cassava seed systems component of the World Bank–funded Food Systems Resilience Program (FSRP) for Sierra Leone and manages the Cassava and Soybean component of the EU-funded Seed4Liberia Project. Beyond cassava, she is expanding her expertise to other vegetatively propagated crops such as yam, banana/plantain, and potato.

Through her expertise and strategic leadership, Mercy has contributed to IITA building strong collaborations and partnerships with key donors and stakeholders, including the Gates Foundation, European Union, African Development Bank (AfDB), World Bank, African governments, private sector players, and farmer organizations.

A passionate advocate for agricultural innovation, Mercy serves as an executive member of the Nigerian Plant Breeding Association (NPBA) and the International Society for Tropical Root Crops (ISTRC). She is widely recognized for her strengths in analytical science, agribusiness, project management, and technology scaling**,** driving transformative change in Africa's seed systems and strengthening food security across the continent.



Dr. Ukoabasi Ekanem holds a Ph.D. in Plant Breeding and Genetics from the University of Ibadan, Nigeria. He is currently a Data Manager with the Cassava Breeding Program at the International Institute of Tropical Agriculture (IITA), where his work focuses on the development of experimental designs, application of appropriate statistical models for data analysis, and development of selection indices to accelerate cassava breeding progress. His expertise also spans cassava ontology development and maintenance, database management, genetic parameter estimation, genome-wide association studies and genomic prediction. Dr. Ekanem collaborates closely with the Product Manager for Crop Variety Development under the Roots, Tubers, and Bananas (RTB) program, contributing to product advancement processes that resulted in the release of multiple cassava varieties in Nigeria, Ghana, Zambia, and Malawi between 2022 and 2024. He previously served as a Graduate Research Fellow at IITA's Genetic Resources Centre (2017–2021), where he led multi-environment trials on Bambara nut, identifying drought-tolerant, high-yielding, and stable accessions. Ekanem also held leadership roles as the General Secretary of the International Association of Research Scholars and Fellows (IARSAF) from November 2018 to December 2019.

Dr. Olajumoke Adeyeye is a gender expert with nearly twenty years of experience in research, capacity building, and advocacy on issues related to gender and youth, including agriculture, health, livelihoods, and entrepreneurship. She is a Gender Researcher at the International Institute of Tropical Agriculture (IITA), Ibadan. She obtained her PhD in Agricultural Extension and Rural Development from the Federal University of Agriculture, Abeokuta, Nigeria, in 2018.

At IITA, she coordinates research activities in Nigeria for the CGIAR Gender Equality and Inclusion (GEI) Accelerator. Her work includes co-developing impactful solutions with science programs and communities to implement gender-transformative approaches that tackle gender norms constraining women's economic resilience within agrifood systems. Before joining IITA, she was a Senior Research Fellow at the Centre for Gender and Social Policy Studies, Obafemi Awolowo University (OAU), Ile-Ife, Nigeria.

She has extensive experience in Nigeria, Mali, Ghana, and Tanzania, leading multidisciplinary and multi-stakeholder projects funded by IDRC, the Bill & Melinda Gates Foundation, and others. Her expertise covers gender analysis, gender-transformative approaches, gender policy, and gender mainstreaming. She has consulted and published both locally and internationally and has received fellowships such as the IITA Graduate Research (2016), INASP AuthorAid (2015), and AWARD (2011).

Dr. Danny Coyne brings over 30 years of experience in agricultural research and extension, specializing in tropical cropping systems. He has held leadership roles in country offices and project management, contributing to the development and management of research projects across African national programs and international agricultural research centers.

Dr. Coyne earned his Ph.D. in Rice Pest and Disease Management from the University of Reading, UK, in 1999, an M.Sc. in Agricultural Research and Development from the University of East Anglia, UK, in 1992, and a B.Sc. (Class 2i Hons.) in Applied Biology from Liverpool Polytechnic, UK, in 1988.

Since 2001, he has served as a Senior Scientist at IITA across Nigeria, Uganda, Tanzania, and Kenya, and he has supervised 19 Ph.D. students and numerous MSc candidates. His research contributions include 10 books, 28 book chapters, and over 218 peer-reviewed journal articles.

Dr. Coyne's work has been recognized internationally, including the Fellowship of the European Society of Nematologists (2022) and the Organization of Nematologists of Tropical America (ONTA) Special Award for outstanding nematological applied research and training in Africa.

Dr. Mercy Lung'aho, a Kenyan national, is the Program Lead for Food Security, Nutrition and Health at the International Institute of Tropical Agriculture (IITA), based in Ibadan, Nigeria. She holds a BSc in food science and Post-harvest Technology from Jomo Kenyatta University and an MSc-PhD in Food Science and Nutrition from Cornell University. Her current research interests focus on food systems transformation, sustainable healthy diets in the face of climate change, and strengthening the nutrition data value chain for accountability and action. With over a decade of experience improving nutrition and health outcomes across Africa, Mercy has led initiatives in more than 30 countries, partnering with multiple stakeholders to deliver impactful results. Her expertise spans advising policymakers, implementing community-level nutrition research, and addressing complex challenges with practical, evidence-based solutions.

A strong advocate for a systems approach, Dr. Mercy leverages agri-food and health systems to tackle both longstanding and emerging issues in nutrition, food security, and health. Her work demonstrates that sustainable change is possible through collaboration, innovation, and strategic action.

Dr. Mercy's commitment to advancing nutrition science is reflected in her involvement with the American Society for Nutrition (ASN), the African Nutrition Society (ANS), and the Institute of Food Technologists (IFT). As a steering committee member of the Micronutrient Data Innovation Alliance (DInA) and a Registered Nutritionist with the Kenya Nutrition and Dietetics Institute (KNDI), she continuously contributes to the field.

Dedicated to transformative change, Dr. Mercy remains at the forefront of global discussions on nutrition and health, particularly in the context of a changing climate. Her vision is to leave the legacy of a healthier, nourished Africa.

Dr. Henri Tonnang, a Cameroonian, is the Head of Data and Research Methods Unit at the International Institute of Tropical Agriculture, Nairobi, Kenya. Henri specializes in data wrangling, modeling, simulation, and visualization transforming complex datasets into actionable insights that support high-impact knowledge transfer and evidence-based policymaking. His ability to bridge scientific research with practical applications has made him a trusted partner for governments, research institutions, and international organizations. Over the past two decades, Henri has worked with institutions such as IITA, ICIPE, FAO, and CGIAR centers, while building global partnerships with universities and development agencies. His leadership has driven innovations in pest forecasting, digital agriculture, and climate-smart solutions across Africa and globally. He holds a BSc and MSc in Physics (1996, 1998), an MSc in Control Engineering (2004), and a PhD in Applied Mathematics (2008). Henri is widely recognized for championing inclusive, science-based, and future-ready digital solutions to address pressing challenges in agriculture, health, and environmental sustainability.

TECHNICAL SESSIONS

Session 1: Climate-Resilient Agricultural Systems (CAS)

Chair: Dr. Ekanem Ukoabasi

1. Building Climate-Resilient Rice Systems: Evidence and Policy Insights from a Systematic Review of Agronomic Adaptation Practices in Nigeria
2. Awareness of African Yam Bean and Its Prospects for Introduction into Cashew-Based Farming Systems in Ogbomoso, Nigeria
3. Biodiversity Conservation in Agricultural Landscapes: a case study of the Ago-Iwoye Farm Settlement in Ogun State, Nigeria
4. Relationship between yield, photosynthetic and growth parameters in winged bean (*Psophocarpus tetragonolobus*)
5. Genes Associated with Drought Tolerance and Susceptibility in *Solanum lycopersicum L*. (Tomato)
6. Effect of Planting Dates on Physiological Yield and Yield Components Parameters of Soybean (*Glycine max)* in Makurdi, Benue State
7. Influence of Horicultural Waste Compost and Nano-Fertiliser on Performance of Okra
8. Assessment of the Environmental impact of Amaranth on Urban Ecology and Landscape Management
9. Multivariate Classification of Pawpaw (*Carica papaya* L.) Varieties Using Agronomic and Nutritional Traits Profile
10. Emergence and Flowering Responses of Bambara Groundnut *(Vigna subterranea* (L.) Verdc.) Accessions to Agroecological Management Practices under Field Conditions in Sub-Saharan Africa
11. Variability of Common bean (*Phaseolus vulgaris L.)* for heat tolerance

Building Climate-Resilient Rice Systems: Evidence and Policy Insights from a Systematic Review of Agronomic Adaptation Practices in Nigeria

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Abstract

The production of rice, a major staple crop and income source for smallholder farmers in Nigeria is largely affected by climate change. Understanding adaptation practices used and their effectiveness is important to guide policy and practice. This systematic review synthesised published evidence on agronomic practices for climate change adaptation in rice production in Nigeria, assessed their effectiveness, and provided policy recommendations. A review protocol was developed to search five databases and relevant grey literature. Out of 638, 17 studies covering 22 states across all six geopolitical zones in Nigeria were selected using predetermined inclusion and exclusion criteria. Quality was assessed using the CASP checklist and data were extracted on study location, design, agronomic practice, implementation, and outcomes. Most studies were surveys reporting adoption rates or farmers' perceptions of effectiveness, with few experimental or modelling studies providing measured yield outcomes. The most frequently reported strategies were irrigation, improved rice varieties, soil and water conservation, and planting date adjustments. They were generally perceived by farmers as effective, and modelling studies suggested positive yield effects, especially when combined. However, implementation details such as irrigation type and planting date shifts were rarely reported, and quantitative yield or income impacts were seldom measured. Although the evidence base is largely descriptive, it indicates clear adaptation patterns. Consequently, stronger empirical evidence, including field trials and longitudinal studies, is needed to quantify benefits and guide location-specific recommendations. These findings can inform research priorities and support targeted extension programs that scale effective climate adaptation strategies in rice production.

Keywords: Climate resilience, agronomic practices, rice production, climate change adaptation, Nigeria.

Awareness of African Yam Bean and Its Prospects for Introduction into Cashew-Based Farming Systems in Ogbomoso, Nigeria

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Abstract

Cashew (*Anacardium occidentale* L.) is an important cash crop in Nigeria, yet its production is constrained by declining soil fertility and limited crop diversification. Farmers often rely on intercropping to secure food and maximize land use efficiency. The African yam bean (*Sphenostylis stenocarpa*), a neglected and underutilized legume with high nutritional value and nitrogen-fixing ability, remains largely excluded from these systems and poorly recognized by cashew farmers. This study investigated farmers' awareness of African yam bean and intercropping practices in Ogbomoso, with the aim of exploring its potential introduction into cashew-based farming systems. Using a multi-stage sampling technique, 151 cashew farmers were purposively selected from major producing communities and interviewed through structured questionnaires complemented with field observations. Data were analyzed using descriptive statistics. The respondents were predominantly male (78.1%), middle-aged (62.4%) and had long farming experience (mean 24 years), while 27.2% of them had never been visited by an extension agent. Awareness of African yam bean was extremely low, with only 7.3% reporting prior consumption and none having cultivated it or known of market opportunities. Intercropping practices were dominated by cassava, maize, yam and tomato, with cassava-based mixtures accounting for 57% of combinations. Despite this, 96% of farmers expressed willingness to adopt African yam bean if seeds and markets were made available. The findings revealed both low awareness and strong potential for adoption. Deliberate awareness creation, seed system development and market linkage are necessary for promoting African yam bean as a sustainable intercrop in cashew systems.

Keywords: Awareness, African yam bean, cashew farming systems, intercropping practices

Biodiversity Conservation in Agricultural Landscapes: a case study of the Ago-Iwoye Farm Settlement in Ogun State, Nigeria.

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Abstract

Agricultural landscapes are critical for global food security but face growing biodiversity loss due to habitat conversion, monocropping, intensive land-use practices, and climate variability. Conserving biodiversity within these landscapes is crucial for maintaining ecosystem services, including pollination, soil fertility, and pest regulation. This paper drawn on a case study of the Ago-Iwoye Farm Settlement (Latitude 6°56'24.68"N and Longitude 3°49'54.76"E) in Ogun State, Nigeria, to explore the dynamics of biodiversity conservation in a smallholder agricultural landscape. A qualitative research design was employed, combining semi-structured interviews with farmers, focus group discussions, and direct field observations. This approach provided in-depth insights into farmers' perceptions, traditional ecological knowledge, and everyday practices influencing biodiversity. Thematic analysis of the data revealed four central patterns: (1) biodiversity decline linked to habitat fragmentation, monocropping, and chemical inputs; (2) the persistence of traditional practices such as mixed cropping and agroforestry that inadvertently support biodiversity; (3) socio-economic barriers, including market pressures, insecure land tenure, and limited extension services, which discourage biodiversity-friendly practices; and (4) opportunities for strengthening conservation through community-based initiatives, farmer education, and incentive-driven policies. The case study demonstrates that while local farmers recognize the ecological importance of biodiversity, practical and economic constraints often limit their efforts to conserve it. Integrating traditional ecological knowledge with modern sustainable farming practices, supported by targeted policies, could enhance biodiversity stewardship at the settlement scale. The findings highlighted the need for farmer-centered, context-specific strategies that balance productivity with conservation in Nigeria's agricultural landscapes.

Keywords: Agricultural landscapes, Biodiversity conservation, Ecosystem services, Sustainable farming.

Relationship between yield, photosynthetic and growth parameters in winged bean (*Psophocarpus tetragonolobus*)

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Abstract

Winged bean (*Psophocarpus tetragonolobus* (L.) DC.) is a multipurpose, valuable, nutritious crop that can help alleviate nutritional and food insecurity, yet remains underutilized. It is important to explore this crop for its utililization. There is little or no information on the relationship between seed yield and photosynthetic or growth parameters in winged bean. Providing this information will help understand the genetic architecture of the crop to accelerate the development of cultivars with superior traits adaptable to climate change. This study determined the relationship between yield and rate of photosynthesis, net assimilation rate, relative growth rate, and specific leaf weight of winged bean. One hundred and ten accessions of winged bean were evaluated over two years using an 11 by 10 alpha lattice design with three replications in three locations. Values for photosynthetic parameters were obtained using a Multispeq device, and growth parameters were calculated. There was significant difference among the accessions and the interaction between the accessions and the environment for all traits studied at a probability level of 0.05. This implies that the accessions and the environment responded differently for all trait studied, therefore, selection can be made for these traits. The photosynthetic traits showed weak positive correlations with Photosynthetic Active Radiation and PhiNPQ while it showed weak negative relationship with PhiNO and the growth Parameters. This study concludes that there is no significant relationship between seed yield and growth or photosynthetic parameters. However, there was relationship among the photosynthetic parameters and among the growth parameters.

Keywords: Photosynthetic parameters, winged bean, growth parameters

Genes associated with drought tolerance and susceptibility in *Solanum lycopersicum* l. (Tomato)

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Abstract

Drought stress poses a threat to global food security, severely affecting the yield and quality of economically important crops, particularly *Solanum lycopersicum* L. (tomato). As climate change intensifies, understanding the intricate molecular and genetic mechanisms underpinning both drought tolerance and susceptibility in tomato becomes paramount for the strategic development of resilient cultivars. This review synthesises current knowledge on target genes and gene families, molecular pathways, and advanced biotechnological approaches that had been successfully employed to identify, characterise, and manipulate specific genes associated with drought tolerant and susceptibility in tomato. Key areas of focus include stomatal regulation, where plants control water loss through leaf pores, and metabolic adjustments, such as the accumulation of osmoprotectants like proline, which help maintain cell turgor. The review also delves into the genetic underpinnings of drought tolerance, examining how specific genes and proteins, like those involved in signal transduction and transcription regulation, contribute to a plant's ability to survive with limited water. Furthermore, the review discusses the implications of these findings for agricultural practices, particularly in breeding drought-resistant crops. By understanding these mechanisms, researchers and breeders can develop strategies to enhance crop resilience, ensuring food security in the face of increasing environmental challenges and it also examines both genetic responses and tomato-specific adaptations, and identifies critical knowledge gaps and promising future research directions crucial for enhancing drought resilience in this vital agricultural crop.

Keywords: Tomato, Drought, Specific genes.

Effect of Planting Dates on Physiological Yield and Yield Components Parameters of Soybean (*Glycine max)* in Makurdi, Benue State

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Abstract

Yield per hectare of soybean in Africa is below optimal, this could be attributed to in-appropriate planting dates practiced by farmer. This study evaluated the performance of three soybean varieties across three planting dates. The experiment was laid out in a 3 × 3 factorial combination arranged in a Randomized Complete Block Design (RCBD) with three (3) replications. Three soybean varieties, TGX-1904-6F, TGX-1835-10E, and TGX-1951-3F, were assessed on July 21st, July 28th, and August 4th The results obtained from Analysis of Variance (ANOVA) showed that planting date was significant for plant height at four weeks after planting, numbers of leaves per plant at four and eight weeks after planting and number of branches per plant at four weeks. Also there was significant variations among the variety for days to first flowering, days to fifty percent flowering, days to 50% maturity, numbers of pod per plant, and pod clearance. However, no significant interaction between variety and planting date was observed for all traits evaluated. The study shows that Soybean yield is greatly reduced when planting is delayed beyond August. Early cultivation (July, 28th) of TGX-1835-10E and TGX-1904-6F Soybean variety is recommended among farmers in Makurdi to maximize its high yielding potential. TGX-1951-3F is recommended for cultivation between 21st to 28th of July if extra early variety is preferred. Farmers should also be discouraged from late planting of soybean after August in Makurdi.

Keywords: Soybean, Planting date, Physiological Yield.

Influence of Horticultural Waste Compost and Nano-fertiliser on the Performance of Okra

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Abstract

Okra (*Abelmoschus esculentus* L.) is a vegetable with high nutritional value, but its productivity is constrained by soil nutrient depletion due to intensified soil use. Inorganic fertilisers reportedly reduce soil health and crop quality. However, integrating organic and innovative feriliser source provide a sustainable solution. This study aims to determine okra performance under neem-based nano-fertiliser and horticultural waste compost (HWC) applications. The experiment consisted of 2×5 factorial combination involving nano-fertiliser (No-nano and nano-fertiliser) and HCW fertiliser at 0, 30, 60, 90, 120 kg N/ha laid out in a randomized complete block design with 4 replicates. Data on growth and yield of NHAe47-4 (spaced at 60 cm × 45 cm) were put to analysis of variance and significantly different means separated with Duncan Multiple Range Test at $P<0.05$. The results showed that combining HWC with nano-fertiliser significantly improved okra growth and yield compared to their sole applications and control. The integrated treatment nano-fertiliser with 90 kg N/ha HCW resulted in a significantly higher plant height (98.63 cm) and leaf area (155.15 cm^2) and enhanced other growth parameters compared to other treatments. The nano-fertiliser with 60 kg N/ha HCW resulted in the significant increase in total number of pods (4,696 pods/ha) and weight of pod (9.54 t/ha) than other treatments. The responses observed for nano-fertiliser combined with 90 and 60 kg N/ha HWC was similar for growth and fruit yield. Therefore, nano-fertiliser with 60 kg N/ha horticultural waste compost offers a sustainable nutrient management strategy of okra production.

Keywords: *Abelmoschus esculentus* (L.), horticultural waste compost, nano fertilizer, sustainable nutrient management

Assessment of the Environmental impact of Amaranth on Urban Ecology and Landscape Management

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Abstract

Amaranth (Amaranthus spp). is a resilient and fast-growing crop valued for its adaptability to diverse environments, nutritional richness, and dual role as both an edible and ornamental plant. Its potential to enhance soil fertility, support biodiversity, and improve urban food systems makes it an ideal choice for promoting sustainable urban agriculture and landscape management. This study assessed the environmental impact of *Amaranthus spp*. within urban ecosystems, emphasizing their role in climate resilient agriculture and landscape management. A completely randomized design was used to test two species, *Amaranthus curentus* and *Amaranthus viridis*. Data collection included soil microbial activity, insect and plant diversity, and post-harvest soil analysis, while landscape design simulations was done using Revit software. Results showed that Soil organic carbon increased from 1.596% to 1.786%, nitrogen from 0.166% to 0.190%, and organic matter from 2.752% to 3.07%, with bacterial populations from 1.12×10^4 to 1.18×10^4 CFU/g organic indicating improved microbial ecosystems and soil structure. In terms in of carbon sequestration, *Amaranthus viridis* recorded 36.86% organic carbon surpassing *Amaranthus curentus* at 31.6% indicating higher ecological contribution. Insect diversity also increased significantly. ANOVA results indicated significant differences of insect diversity at $p < 0.05$ in week 3 and $p < 0.001$ in weeks 5 and 6. In conclusion, integrating Amaranth into urban agricultural and landscape systems promotes environmental sustainability and biodiversity conservation while contributing to improved nutrition and sustainable food security in urban communities.

Keywords: Urban agriculture, Biodiversity, Soil health, Carbon sequestration, Landscape management.

Multivariate Classification of Pawpaw (*Carica papaya* L.) Varieties Using Agronomic and Nutritional Traits Profile

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Abstract

Pawpaw (*Carica papaya* L.) is a tropical fruit valued for its agronomic, nutritional, and economic importance. The varietal variability necessitates identifying superior genotypes to enhance breeding efficiency and improve production. This study assessed thirteen pawpaw varieties from the National Horticultural Research Institute (NIHORT), Ibadan, Nigeria, to evaluate agronomic and nutritional variability and classify varieties based on similarities. Agronomic traits included tree height, diameter, height to first fruit, nodes to first flower, fruit weight, fruit number, and fruit length. Nutritional and quality traits, including ash, protein, lipid, fibre, carbohydrate, minerals (K, Na, Ca, Zn, Fe), pH, total soluble solids (°Brix), colour indices (L^*, a^*, b^*), phenolics, flavonoids, lycopene, β-carotene, and vitamin C, were analysed using AOAC methods. Data underwent ANOVA, correlation, principal component, cluster, and genotype by yield×trait (GYT) analyses in R. Highly Significant ($p < 0.001$) effects observed across most traits indicated substantial phenotypic diversity. The first five principal components explained 74% of variation, dominated by nodes to first flower, fruit weight, tree height, lycopene, β-carotene, and vitamin C. Correlation analysis showed strong positive relationships, notably Ca and Fe ($r = 1.00^{***}$) and K and Zn ($r = 1.00^{***}$), while moisture and carbohydrate were strongly negatively correlated (r = -0.96***). Cluster analysis grouped varieties into three agronomic-nutritional clusters. Based on GYT indices, Varieties 10, 17, and 8 ranked highest, combining high yield with superior lycopene and vitamin C contents. These findings demonstrate the value of multivariate and GYT analyses in selecting high-yielding, nutritive pawpaw varieties for improvement.

Keywords: Characterization, horticulture, Pawpaw, Agro-nutritional content, genotype by yield×trait

Emergence and Flowering Responses of Bambara Groundnut *(Vigna subterranea* (L.) Verdc.) Accessions to Agroecological Management Practices under Field Conditions in Sub-Saharan Africa

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Abstract

Bambara groundnut (*Vigna subterranea* (L.) Verdc.) is a drought-tolerant African legume with significant potential for sustainable food production under low-input systems. This study assessed the effects of arbuscular mycorrhizal fungi (AMF) inoculation and tillage practice on germination and flowering responses of selected Bambara groundnut accessions as part of a broader agroecological intensification framework. A split–split plot design was used with three AMF inoculation treatments (non-inoculated, *Rhizophagus irregularis*, and *Glomus mosseae*), two tillage practices (ridge or no ridge), and six accessions of Bambara groundnut (TVSu-515, TVSu-305, TVSu-365, TVSu-2063, TVSu-1633, and TVSu-1635), replicated thrice. Data on germination and flowering at different weeks after sowing were subjected to analysis of variance (ANOVA). Results revealed that tillage and accession significantly influenced days to emergence, plant stand, and flowering ($p < 0.001$), while AMF inoculation alone had no significant effect ($p > 0.05$). However, significant accession × tillage and accession × AMF interactions indicated genotype-specific responses to soil and microbial conditions. These findings suggest that tillage and genetic variability are primary drivers of early growth and phenological performance, whereas AMF benefits may manifest more prominently in nutrient uptake and yield-related parameters. The study highlights the potential of integrating AMF inoculation with optimized tillage and genotype selection to enhance Bambara groundnut productivity and resilience in Sub-Saharan Africa's agroecological systems.

Keywords:

Bambara groundnut, Arbuscular mycorrhizal fungi, tillage, emergence and flowering.

Variability of Common bean (*Phaseolus vulgaris L.)* For heat tolerance

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Abstract

Heat stress is becoming an increasingly important constraint in common bean production due to climate change. Moreover, the ongoing temperature rise is likely to make even favorable productive areas face similar problems in the future. This study aims to identify heat-tolerant genotypes among 36 common bean genotypes using key physiological and yield-related indicators under both stress and non-stress environments. A trial using RCBD design with three replications was conducted in screen houses in two sites, Morogoro (Stress site) and Mbeya (Non-stress site). While the non-stress site naturally had ideal weather conditions to avoid heat stress, the stress site maintained a high temperature well above the minimum critical required, with the help of insulation and an electrical heater, to effectively simulate a heat stress environment. Traits evaluated include pollen viability (PV), pod harvest index (PHI), yield and yield components, days to maturity and diseases. Data were subjected to analysis of variance. Significant genotype differences were observed across several traits. Genotype G 40001 consistently performed well under heat stress compared to others, scoring relatively high pollen viability (66.35%), high PHI (75.71%) and high seed yield (1.6 T/ha). Strong positive correlation between pollen viability, PHI and yield components under stress conditions confirmed their utility as indicators for heat tolerance. A few other genotypes including HTA9, G122 and HTA4 also showed promising performance under heat stress. This finding highlights valuable genetic resources in breeding for heat–tolerance common bean varieties suitable for hot climates especially under the unprecedented phenomenon of climate change.

Keywords: *Phaseolus vulgaris*, heat tolerance, yield, pollen viability, climate change.

Session 2: Soil Health and Plant Protection (SHPP)

Chair: Dr. Danny Coyne

1. Dynamics of Nitrate, Heavy metal, and Herbicide Impacts on Soil Physicochemical and Hydropedological properties across contrasting Agroecology of Nigeria
2. The Knowledge–Practice Divide: A Systemic Barrier to Soil Health and Climate Resilience in Nigeria
3. Evaluating Virulence of Cassava Root Rot Pathogens on Two Cassava Cultivars
4. Phytochemical and Antimicrobial Activity of Mistletoe (*Tapinanthus globiferus* A. Rich, Tiegh.) on Selected Clinical Organisms using Two Different Solvents
5. Investigating the Occurrence, Characterization, and Diagnosis of Yam Virus Y in Yam (*Dioscorea spp*.) Germplasm
6. Innovative Nematicide Delivery Systems and Their Implications for Soil Health in Potato & Pea Cropping Systems
7. Vertical Distribution of Selected Nutrient Elements in Soils from Ajali Sandstone in Nkaliki, Ebonyi State
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11. Influence Of Composted Urine And Sawdust Amendments On Soil Physicochemical Properties And Growth Performance Of Cabbage (*Brassica oleracea L.*)
12. Evaluation of black soldier fly frass fertilizer rates for optimal kale production in a vegetable intensified push-pull cropping system
13. Integrated Management of Banana Aphid (*Pentalonia nigronervosa*) on *Musa* Cultivars

Dynamics of Nitrate, Heavy metal, and Herbicide Impacts on Soil Physicochemical and Hydropedological properties across contrasting Agroecology of Nigeria

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Abstract

Nitrate leaching, heavy metal accumulation, and herbicide persistence pose serious risks to soil degradation and groundwater contamination across tropical agroecosystems in Nigeria. This study examined the spatial and temporal distribution of nitrate (NO_3^-), ammonium (NH_4^+), phosphate (PO_4^{3-}), dissolved organic carbon (DOC), heavy metals (Pb, Zn, Cu, Cd), and herbicide residues across contrasting soil textures, and agroecological zones through integrated physicochemical and hydropedological assessments. A total of 240 composite soil samples were stratified by depth (0–15, 15–30, 30–60 cm). Data were examined by correlation analysis, regression modelling, and ANOVA. The results showed NO_3^- concentrations of 4.38–9.52 mg L^{-1}, with Lagos exhibiting the greatest leaching risk. DOC (3.87–5.43 mg L^{-1}) was positively correlated with NO_3^- ($r = 0.61$). Kwara soils had high Pb (8.9–12.4 mg kg^{-1}) and Cd (1.12–1.97 mg kg^{-1}), having lithogenic enrichment. Atrazine residues were greatest in Imo (1.11–1.48 µg L^{-1}), reflecting enhanced sorption in clay-rich Ultisols and Oxisols, while glyphosate was <1.05 µg L^{-1} at all sites. Regression analysis showed clay ($\beta = -0.41$), SOC ($\beta = -0.32$), and bulk density ($\beta = 0.29$) as key predictors of nitrate mobility ($R^2 = 0.47$) at $p < 0.05$. Soils in Lagos exhibited strong vertical leaching during wet-season recharge, Soils in Kwara sequestered heavy metals below Arenosols, and soils in Imo retained herbicide residues in Ultisols and Oxisols. The results showed that contaminant dynamics are controlled by soil physicochemical properties and hydropedological processes.

Keywords: Nitrate leaching, Heavy metals, Herbicide residues, Soil–Water interactions

The Knowledge–Practice Divide: A Systemic Barrier to Soil Health and Climate Resilience in Nigeria

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Abstract

Soil degradation poses a systemic threat to the sustainability of African food systems and climate resilience, undermining productivity, environmental sustainability, and the livelihoods of smallholder farming communities. In Nigeria, where a vast population depends on agriculture, the role of extension services in disseminating knowledge on sustainable soil management is critical. This study examined how farmers accessed and utilized extension information to mitigate soil degradation, with the objective of drawing lessons to enhance climate-resilient agriculture. Data were collected from 180 farmers through structured questionnaires and analyzed using descriptive statistics and chi-square tests. Results revealed that waterlogging, soil erosion, and improper waste disposal were the most pressing forms of degradation reported, with farmers noting increases over a five-year period. Agricultural extension agents and radio/television emerged as the dominant information sources, while low-cost traditional practices such as organic manuring and cover cropping were the most widely adopted. Conversely, more technical measures, including irrigation and controlled ploughing, were rarely used, largely due to high cost and complexity. Chi-square analysis showed no significant relationship between farmers' occasional information use and soil outcomes, highlighting a persistent gap between knowledge access and sustained practice. The study concludes that improving climate resilience requires moving beyond mere information dissemination. A more systemic strategy involving continuous engagement, technical training, targeted incentives, and stronger policy support is needed to bridge the adoption gap and strengthen climate-resilient agricultural systems in Nigeria.

Keywords: Soil degradation, agricultural extension, knowledge-practice divide, farmer adoption, climate resilience.

Evaluating Virulence of Cassava Root Rot Pathogens on Two Cassava Cultivars

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Abstract

Cassava (*Manihot esculenta*) is a staple crop vital to food security in sub-Saharan Africa. Previous studies reported that root rot pathogens contribute to 80% yield losses in Sub-Saharan Africa (SSA), but a limited understanding of their virulence hampers effective control. Therefore, this study was designed to evaluate the virulence of rot pathogens on two cassava cultivars. A total of 104 isolates from the IITA Ibadan culture collection, mainly cassava rot pathogens, were cultured on Potato Dextrose Agar (PDA) and pre-screened based on their morphological characteristics. From these, twenty-five representative isolates were selected for in vitro pathogenicity testing. Healthy root tubers of two cassava cultivars, TMEB 1 and IBA 070593 were collected, surface-sterilized, and used in pathogenicity assays arranged in a completely randomized design with five replicates. Percentage rot severity (PRS) was analyzed using ANOVA at $\alpha = 0.05$. Results showed that isolates Osogbo 85, Osogbo 79, and Osogbo 89 caused the highest levels of rot severity (71.5%, 69.5%, and 67%, respectively). Among the identified species, *Fusarium verticillioides* exhibited the highest overall severity (41.2%), followed by *Neocosmospora suttoniana* (38%) and *Neocosmospora bostrycoides* (32.2%). The cultivar IBA 070593 demonstrated a susceptibility rate of 48%. The present study highlights the critical role of cultivar selection in disease management, emphasizing the need for molecular identification and genetic diversity studies to improve understanding and develop region-specific control strategies.

Keywords: Cassava, cultivar, pathogenicity, Rot pathogens, tuber.

Phytochemical and Antimicrobial Activity of Mistletoe (*Tapinanthus globiferus* A. Rich, Tiegh.) on Selected Clinical Organisms using Two Different Solvents

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Abstract

Medicinal plants remain vital for treating infections, especially as rising drug resistance increases the search for safer natural remedies. The study investigated the qualitative and quantitative phytochemical constituents and antimicrobial activities of the leaf extracts of Mistletoe (*Tapinanthus globiferus*). Chloroform and ethyl acetate were used in extracting the bioactive components. The agar well diffusion method was used to investigate antimicrobial activities. Phytochemical tests showed tannin, phenol, alkaloids, flavonoids, and saponin present at varying intensities. Quantitative analysis revealed tannin (2.70–7.01%), phenol (3.18–5.01%), alkaloids (2.65–6.19%), flavonoids (2.85–8.46%), and saponin (2.63–5.85%). Chloroform extract showed inhibition zones of 10.67 mm (*Salmonella enterica*), 17.33 mm (*Pseudomonas aeruginosa*), 15.33 mm (*Staphylococcus aureus*), 15.33 mm (*Penicillium digitatum*), and 11.00 mm (*Rhizopus stolonifer*). Ethyl acetate extract showed 12.67 mm, 12.00 mm, 9.33 mm, 14.00 mm, and 18.67 mm, while crude extract showed 11.67 mm, 7.00 mm, 13.67 mm, 8.33 mm, and 0 mm respectively. Controls (Gentamicin, Ketoconazole) showed 35–46 mm and above 43 mm for all test organisms. The study concludes *T. globiferus* leaf extracts contain potent bioactive compounds, suggesting potential as a natural, safe, and affordable antimicrobial source.

Keywords: Phytochemical, Antimicrobial, Qualitative, Quantitative, Extract, Inhibition, Microorganisms.

Investigating the Occurrence, Characterization, and Diagnosis of Yam Virus Y in Yam (*Dioscorea spp*.) Germplasm.

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Abstract

Yam Virus Y (YVY), a *Betaflexiviridae* with a single-stranded RNA genome, is a cryptic virus detected in yam (*Dioscorea* spp.) germplasm in Nigeria, Ghana, Côte d'Ivoire, and Guadalupe. The virus was detected in symptomatic and asymptomatic yam plants, while the former was co-infected with Yam mosaic virus (YMV, genus *Potyvirus*). This study was undertaken to assess the extent of distribution of YVY in yam germplasm. For this study, 413 yam samples, including in vitro plants and those sampled from the field, were indexed for YVY using reverse transcriptase-polymerase chain reaction (RT-PCR). YVY-specific primers designed at the Virology and Molecular Diagnostics Unit, IITA, were used for the assay. Samples indexed comprised *D. rotundata* (**350**), *D. alata* (**40**), and *D. bulbifera* (**23**). Indexing results revealed that **64%** *D. rotundata* and **20%** *D. alata* tested positive for YVY. In contrast, YVY was not detected in the *D. bulbifera* accessions. While this result was consistent with previous reports on YVY incidence in *D. rotundata* in Nigeria, YVY was also detected in other yam species. Molecular characterization of YVY amplicons obtained from this work would be instrumental in bridging the knowledge gap on its biology, epidemiology, host range, and molecular diversity. These findings are vital for reliable YVY detection, germplasm phytosanitation, and the safe international exchange of yam planting materials.

Keywords: Yam Virus Y, Cryptic, RT-PCR, Host range

Innovative Nematicide Delivery Systems and Their Implications for Soil Health in Potato & Pea Cropping Systems

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Abstract

Sustainable nematode management requires balancing suppression of plant-parasitic nematodes (PPN) with the conservation of soil health, which is often missed by traditional chemical methods that harm non-target beneficial soil organisms. This study investigated banana fibre paper (BFP) as a novel carrier for chemical (fluopyram, abamectin) and biological (*Trichoderma* spp.) agents in potato and pea production systems. Trials were conducted in Nyandarua and Nyamira counties to evaluate the effects on beneficial free-living nematode (FLN) densities, nematode community shifts, and microbial biomass. Chemical-based paper treatments negatively altered soil nematode community composition, with up to 50% reductions in beneficial nematodes observed. In contrast, *Trichoderma*-treated paper not only reduced PPN density threefold, but also increased FLN abundance by 56%, microbial biomass by 117%, and enhanced ecological balance in the soil food web. Untreated BFP showed limited PPN suppression relative to the farmer-practice control, underscoring the need for integrated interventions. These results highlight that use of BFP as a delivery mechanism significantly influences ecological outcomes. Banana fibre paper provided a platform for enhancing the soil health benefits of biological control agents. It demonstrates dual functionality by integrating nematode suppression with soil health improvement, offering an adaptable ecofriendly tool which safeguards ecosystem services.

Keywords: Banana fibre paper technology, free-living nematodes, microbial biomass, *Trichoderma*

Vertical Distribution of Selected Nutrient Elements in Soils from Ajali Sandstone in Nkaliki, Ebonyi State.

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Abstract

Morphogenetic soil studies are crucial for understanding how soils form, how they are classified, and for land-use planning. This research examined the morphogenetic properties of soils in the Nkaliki area (Abakaliki LGA, Ebonyi State) by excavating four profile pits at different locations. Although its soil remains poorly characterized, but important for farming, which impacts site-specific soil management and sustainable land use. Soil samples were taken from various genetic horizons, totaling 18 samples. The samples were air-dried and analyzed for physical, chemical, macro-, and micronutrient properties. Correlation and coefficient of variation analyses were performed using GenStat and SPSS. Results showed soil colors ranging from 5YR4/4 (reddish-brown) to 10YR5/8 (yellowish-brown). The physical properties were primarily influenced by the sand fractions, with sand, silt, and clay contents ranging from 655.2 to 945.2 g/kg, 44.4 to 254.8 g/kg, and 10.4 to 90.4 g/kg, respectively. The bulk density was moderate, between 1.17 and 1.21 g/cm³. The soil had a pH of 5.79 to 5.92, indicating mild acidity, and low organic matter content (9.54 to 16.98 g/kg). Macronutrient levels were low, with total nitrogen ranging from 0.12 to 0.20 g/kg, available phosphorus from 7.33 to 13.11 mg/kg, and potassium from 0.38–0.75 cmol/kg. Micronutrient levels were also limited, with zinc, copper, and manganese ranging from 0.07–0.53 mg/kg,0.06–0.74 mg/kg, and 0.32–1.00 mg/kg, respectively. The soils in Nkaliki are mainly sandy, have moderate bulk density, low organic matter, and are slightly acidic. These findings provide valuable insights into soil classification, fertility evaluation, and planning sustainable agricultural practices in the region.

Keywords: Abakaliki, Nigeria, soil morphogenesis, soil classification, soil properties, soil nutrients

Morphometric analysis of cowpea seeds from BCMV-infected and healthy plants using the Videometer multispectral imaging method.

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Abstract

Seed quality assessment has been achieved traditionally through physical, biochemical, and molecular techniques. This often requires destructive sampling, is laborious, time-consuming, and costly. Videometer, a multispectral imaging system, can be used for seed characterization by analyzing the spectral images of seed surfaces, allowing for non-destructive and rapid assessment of seed quality. This study utilized the VideometerLab4 device to differentiate between genotypes, uninfected cowpea seed lots and seed lots infected with bean common mosaic virus (BCMV, Potyvirus) at different growth stages. Nine cowpea genotypes were mechanically inoculated at 7, 21, and 40 days after planting (DAP) with BCMV, with the uninoculated group serving as a healthy control. The experiment was performed in an insect-proof screenhouse of the Virology-Germplasm Health Units, IITA, Ibadan. The design was a 4 × 9 factorial in a completely randomized design (CRD) replicated 6 times. Seeds harvested from each seed lot were captured using the Videometer, and seed morphometric traits were measured from extracted blobs, focusing on seed size, shape, color, volume, and orientation. Analysis of variance (ANOVA) was done using Genstat Discovery edition, and treatment means were separated using the F-LSD at 5% probability level. The genotypes varied significantly in most traits evaluated. Virus time of infection also significantly influenced seed morphometrics, with a significant reduction in seed sizes (seed area, length, width), seed deformation, and changes in seed color components (CIE Lab A and L) observed particularly in early infected (7 and 21 DAP) seeds of susceptible genotypes. Early protection of cowpea can save both seed yield quantity and quality.

Keywords: Cowpea seeds, Videometer, BCMV, seed morphometrics, seed quality

Comparative Leaf Epidermal Studies of Three Species in the family Moraceae (*Ficus natalensis, Ficus lutea and Ficus thonningii*) Natal fig, Giant leaved fig and Strangler fig

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Abstract

Comparative leaf epidermal study of three species in the family moraceae (*Ficus natalensis, Ficus lutea* and Ficus thonningii) Natal fig, Giant leaved tree and strangler fig respectively. The study was done to ascertain distinct anatomical characters between the species and discovering the relationship among the species bringing about taxonomy. The epidermal layers of the plants were separated by chemical peeling using concentrated nitric acid. The leaves of the plant were soaked and the presence of bubbles on the surface of the leaves indicates the readiness for peeling. After which the leaves were placed in a petri dish and rinsed with water thrice. The layers were separated using forceps and carmel hair brush, mounted on a purified glass slides and stained with safranin O for five minutes, rinsed with water and remounted on a neat microscopic glass slides using glycerol and was gently covered with cover slips and sealed with nail varnish. The characters of the species were studied on the adaxial and abaxial surface. On the adaxial surface the species have no stomata type, have anticlinal wall, similarities in epidermal cell shape and all leaves hypostomatic, presence of trichomes and absence of egarstic substances on *Ficus natalensis*, separated it from other species. On the abaxial surface, the species all have stomata type, similarities in epidermal cell shape, have anticlinal wall with the same pattern, Absence of trichomes and presence of egarstic substances on *Ficus natalenis* separated it from other species.

Keywords: Comparative, anatomical characters, epidermal layer, trichomes, ergastic substances.

Detection and Characterization of *Cercospora* Spp. Associated with Cowpea Leaf Spot Disease in Various Agroecological Zones in Nigeria

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Abstract

Cowpea production potential in Africa is not fully realized due to many biotic stressors that decimate yield, such as *Cercospora* leaf spot disease (CLSD), a fungal disease. The current study employed a multistage sampling technique to collect cowpea leaves showing symptoms of CLSD across five agroecological zones (AEZs) in Nigeria, cutting across Bauchi, Benue, Kaduna, and Niger states. Five Local Government Areas (LGAs) were randomly selected from each state, and three farmers' fields were visited (total = 60 fields). On each farmer's field, 25 samples were collected randomly (total = 1,500 leaf samples). Fungal isolation and culturing were done following standard procedures. Morphological descriptors for *Cercospora* isolates and disease severity (DS) varied within and between AEZs. DS was highest in Mid Altitude (48.8%) while Southern Guinea Savanna had the lowest (21.5%). Two hundred and forty *Cercospora* spp. isolates were characterized and screened using ITS and *Cercospora-specific* primers (CFP). Sequence demarcation tool (SDT) revealed 94 – 100% similarity among the isolates, while showing 92–100% similarity with sequences of *Cercospora* spp. from Nigeria obtained from GeneBank. Phylogenetic analyses grouped the isolates in three distinct clades of *C. canescens.* Pathogenicity assays using detached leaves revealed that all tested isolates were pathogenic, although the DS scores varied from moderate to high. High-level morphological and genetic variation was detected among isolates, although all were able to cause CLSD in Nigeria. Findings of the current study will allow designing strategies to effectively manage CLSD in areas where the disease is prevalent.

Keywords: Cowpea, *Cercospora* spp, agroecological zones, morphological variation, genetic variation, CLSD

Influence of Composted Urine and Sawdust Amendments on Soil Physicochemical Properties and Growth Performance of Cabbage (*Brassica oleracea L.*)

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Abstract

Soil degradation remains a major threat to agricultural productivity and environmental sustainability. Understanding its impact and exploring sustainable soil management options is essential for maintaining soil fertility and crop yield. This study assessed the influence of composted urine + sawdust and composted sawdust on the physical and chemical properties of degraded soil and on the growth performance of cabbage (*Brassica oleracea L.*) in Nsukka, Southeast Nigeria. A screenhouse experiment conducted in 2023 followed a completely randomized design (CRD) with nine treatments and three replicates: T1 - Composted urine + sawdust (30 t/ha); T2 - (20 t/ha); T3 - (10 t/ha); T4 - (20 t/ha) + 25% NPK; T5 - (20 t/ha) + 50% NPK; T6 - Composted sawdust (10 t/ha) + 50% NPK; T7 - Composted sawdust (10 t/ha); T8 - NPK 20:10:10 (150 kg/ha); T9 - Control. Results showed that organic amendments significantly improved soil properties compared to the control. T3 (composted urine + sawdust at 10 t/ha) recorded the highest hydraulic conductivity (40.7cm^3/hr), porosity (38.9cm^3), and aggregate stability (64.6cm^3), while T6 recorded the highest available phosphorus (97.5mg/kg). Cabbage under T3 exhibited superior leaf number, plant height, and shoot biomass, producing the best overall vegetative performance, while T5 produced the highest root weight. Treatments showed no significant effect on soil nitrogen and potassium, though slight numerical variations occurred. Overall, composted urine and sawdust, particularly at 10 t/ha, effectively enhanced soil quality and cabbage growth, providing a sustainable, eco-friendly strategy for improving degraded soils and supporting resilient agricultural systems.

Keywords: Soil-degradation, Compost, Human urine, NPK, Cabbage, Soil Properties.

Evaluation of black soldier fly frass fertilizer rates for optimal kale production in a vegetable intensified push-pull cropping system

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Abstract

Synergizing diversified cropping systems with organic fertilizers has been recognized as one of the pathways to achieve sustainable agricultural intensification. Recently, vegetables integrated push-pull technology (VIPPT) has shown promise in crop protection, yield and climate change resilience. On the other hand, organic fertilizers such as the black soldier fly frass fertilizer (BSFFF) suppress pests and diseases, enhance soil fertility and boost overall crop production. However, no study has explored the effects of integrating the two technologies on yield and pest control. This study, therefore, investigated the effects of different BSFFF application rates on kale growth, pest infestation, natural enemies and yield grown under VIPPT in two agroecological zones (Embu and Murang'a). The treatments included five BSFFF rates (0, 50, 100, 150 and 200 kg N ha^{-1}), inorganic fertilizers (DAP and NPK), and an unfertilized control. Across the two sites, plants treated with 200 BSFFF exhibited faster growth and higher yield by 7% and 82% compared to 150BSFFF and 0BSFFF, respectively. Similarly, aphid infestation was lower in the 200BSFFF treatment by 64% and 1 % compared to inorganic fertilizer and 0BSFFF, respectively. Additionally, natural enemies such as Coleoptera (35% and 97%), Hemiptera (17% and 97%) and Diptera (100% and 44%) were more abundant in 200BSFFF than 0BSFFF and inorganic fertilizer treatments, respectively. Our findings demonstrate that integration of VIPPT and 200BSFFF protects kales against aphid attack and increases diversity of natural enemies, whilst improving kale yield. The two technologies offer a sustainable alternative towards safe vegetable production, environmental and biodiversity conservation.

Keywords: Agricultural intensification, vegetable integrated push pull technology, Black soldier fly frass fertilizer, Synergistic cropping systems, natural enemies.

Integrated Management of Banana Aphid (Pentalonia nigronervosa) on *Musa* Cultivars

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Abstract

Banana (*Musa spp*.) is one of the most important staple foods and commercially grown crops globally; however, its production is often threatened by the invasive banana bunchy top virus (BBTV), which is vectored by the banana aphid (*Pentalonia nigronervosa* Coquerel). While the BBTV geographic spread is restricted to 17 countries in sub-Saharan Africa, the banana aphid is ubiquitous in distribution and known to occur in all the banana production regions. If BBTV is introduced in a new location, either by an aphid vector or infected planting material, the banana aphids in the location can acquire the virus while feeding on the infected plants and contribute to further spread. Banana aphid feeding is not known to cause any damage to the host, but as a vector of BBTV, it is a significant threat to bananas. The integrated management of BBTV involves banana aphid management to prevent the spread of the virus and control the reinfection of newly planted bananas in the BBTV-affected regions. Aphids generally inhabit beneath the pseudostem sheets that act as a cover protecting them. Methods for banana aphid control are limited. The ongoing study evaluates the differential susceptibility of Musa cultivars to banana aphid multiplication to identify *Musa* varieties with tolerance to aphid multiplication. Simultaneous efforts involve using entomopathogenic insects and botanicals to manage BBTV in an eco-friendly manner. An integrated approach offers a promising solution to reduce vector-mediated spread of BBTV and protect banana production.

Keywords: Banana bunchy top virus (BBTV), *Pentalonia nigronervosa*, Integrated Management, *Musa spp*., Virus-vector

Session 3: Systems Thinking, Digitalization and Innovation in African Food Systems (SDIAFS)

Chair: Dr. Henri Tonnang

1. Cocoa Artificial Remote Sensing Intelligence (CARSI) System for Cacao Farm Mapping (**Poster presentation)**
2. Detection of Yam Anthracnose Disease Using Deep Learning Models
3. The Circular Economy: Harnessing Entrepreneurship for Promoting Sustainable Development and Food Security in Sub-Saharan Africa
4. Smart Thinking Agriculture: The Focus on Food Security and Sustainable Development in the UK
5. Comparative Evaluation of a 3D-Printed T-Cup Device and Thermocycler for LAMP-Based Detection of *Africa Cassava Mosaic Virus*

Cocoa Artificial Remote Sensing Intelligence (CARSI) System for Cacao Farm Mapping

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Abstract

This project introduces Cocoa Artificial Remote Sensing Intelligence (CARSI), an enhanced monitoring and management system for cacao farms. The project aims to develop a model for detecting cacao plants using high-resolution Landsat and Sentinel satellite imagery, accessed through Google Earth Engine (GEE) and images of cacao trees collected using a GIS-enabled drone equipped with a multispectral camera, as well as GoPro RGB images. Image classification will be performed using machine learning algorithms such as the Random Forest (RF) and Convolutional Neural Net (CNN). CARSI aims to utilize Pix4d mapper for photogrammetry, QGIS for analysis of remote sensing spatial data, raster calculation of Normalized Difference Vegetation Index (NDVI), and Cacao SeedTracker aimed at large-scale cocoa farm registration and mapping, identification of cacao tree counts, collection and analysis of trait data, and delivering tailored, actionable data-driven advice directly to farmers, based on the derived AI insights. This entails cacao farm identification, farm size estimation, crop performance based on the NDVI index, and provision of advisories to farmers to promote sustainable practices, improve yield, standardize farm management, and ensure traceability.

Keywords: Cacao farms, Remote Sensing, Artificial Intelligence, Machine Learning, Quantum Geographic Information System

Detection of Yam Anthracnose Disease Using Deep Learning Models

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Abstract

Yam anthracnose, caused by *Colletotrichum gloeosporioides*, is a serious threat to yam (*Dioscorea* spp.) production worldwide. Young plants are particularly susceptible, and infections can occur throughout all growth stages, leading to significant yield losses. Rapid and accurate detection of this disease is critical for effective management and timely intervention. This study aimed to develop deep-learning models capable of detecting yam anthracnose in field conditions and screen-house environments. A dataset of approximately 1,600 Red Green Blue images of yam plants showing anthracnose symptoms were taken from fields and screen houses. Images were pre - processed and augmented using the Keras Sequential Image-Augmentation pipeline, applying horizontal and vertical flipping, random rotation, contrast adjustments, and zooming to increase data diversity and improve model robustness. RandomForest, ResidualNetwork50 (ResNet50), ResidualNetwork152 (ResNet152) and custom CNN were trained and iteratively tuned for optimal performance. Among the evaluated models, the ResNet-50 achieved the highest classification accuracy of 95%, followed by a Random Forest classifier with 90% accuracy. In contrast, ResNet-152 and a custom convolutional neural network (CNN) achieved lower accuracy scores of 57% and 70% respectively, highlighting the advantage of the more compact yet powerful ResNet-50 architecture for this task. The findings show that deep learning, particularly transfer learning with ResNet-50, offers a reliable approach for detecting yam anthracnose from field and greenhouse plant images. Further work focused on improving the detection accuracy and quantification of symptom severity based on the percent symptomatic area. This study underscores the potential of artificial intelligence for developing a practical decision-support tool for disease diagnosis and precision phenotyping.

Keywords: Anthracnose, ResNet, Management, Accuracy, phenotyping

The Circular Economy: Harnessing Entrepreneurship for Promoting Sustainable Development and Food Security in Sub-Saharan Africa

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Abstract

The circular economy (CE) offers a transformative framework for addressing the complex challenges of unemployment, poverty, environmental degradation, and food insecurity in Sub-Saharan Africa (SSA). This study explores the potential of CE-driven entrepreneurship in promoting sustainable development and food security across selected SSA countries. It assesses key agricultural, energy, food security, and environmental indicators from World Bank Development Indicators (WDI) and Food and Agricultural Organization (FAO) relevant to CE adoption. It also identifies opportunities and challenges for CE-driven entrepreneurship, and provides evidence-based policy recommendations to enhance CE integration. The study is based on systems thinking theory, sustainable development principles, and entrepreneurship, emphasizing the interconnectedness of economic, environmental, and social dimensions. Case studies from Kenya, Ghana, and South Africa illustrate the practical application of CE principles through solar-powered cold storage, plastic upcycling, and urban farming initiatives. However, the transition to CE faces numerous barriers, including socio-economic constraints, inadequate infrastructure, political instability, and limited access to technology. Addressing these challenges requires targeted financial incentives, educational initiatives, policy reforms, infrastructure investment, and multi-stakeholder collaboration. Future research should focus on addressing data gaps, exploring context-specific business models, investigating the role of digital technologies, and analyzing socio-cultural and behavioral determinants of CE adoption. By prioritizing circularity, SSA countries can create an enabling ecosystem for sustainable economic transformation and significantly advance progress toward the Sustainable Development Goals.

Keywords: Circular economy, entrepreneurship, sustainable development, Africa, innovation, environmental justice, food security, SDGs.

Smart Thinking Agriculture: The Focus on Food Security and Sustainable Development in the UK

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Abstract

This study explores the potential of smart agriculture technologies to enhance sustainability and food security in the United Kingdom (UK). Amid rising energy costs, Brexit, supply chain disruptions, climate change, and a growing population, the integration of advanced technologies such as the Internet of Things (IoT), Artificial Intelligence (AI), and precision farming is essential for improving agricultural practices. Utilizing secondary data from UK government reports, National Farmers' Union (NFU) and Food and Agriculture Organisation (FAO) this exploratory research employs thematic synthesis, comparative trend analysis, and policy perspectives to evaluate how these technologies can boost productivity, resource efficiency, and environmental outcomes. The findings show that while the UK agricultural sector demonstrates innovative capacity, it faces significant challenges regarding food security, environmental sustainability, labour dynamics, and climate change impacts. Smart agriculture offers a feasible solution, yet regional disparities in technology adoption must be addressed. The UK's heavy reliance on food imports highlights the need for increased domestic production. Although smart agriculture can improve resource efficiency, its broader impacts require careful assessment. Automation could help mitigate labour shortages, but the risk of job displacement necessitates thoughtful policy measures. Moreover, precision agriculture can assist in combating climate change effects, but achieving long-term resilience demands comprehensive strategies. In conclusion, sustained investment in technology, education, and policy development is crucial for realizing the full potential of smart agriculture in the UK, ultimately fostering a more resilient and secure food system for the future.

Keywords: Smart Agriculture, Food Security, Sustainability, Technologies, Precision Farming

Comparative Evaluation of a 3D-Printed T-Cup Device and Thermocycler for LAMP-Based Detection of *Africa Cassava Mosaic Virus*

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Abstract

The Africa cassava mosaic virus (ACMV), one of the endemic viruses responsible for cassava mosaic disease (CMD), is a major threat to cassava production in sub-Saharan Africa, making the development of affordable and field-deployable diagnostic methods essential for surveillance and seed certification. Loop-mediated isothermal amplification (LAMP) offers a simple, rapid, on-the-field method for virus detection. However, it requires a device to maintain the reaction temperature at a constant temperature of 60 °C for about 30 min, and often specialized devices are used, which is a limitation for low-cost testing in poorly equipped labs or in the field. In this study, we adopted a low-cost, 3D-printed, reusable Temperature-Cup (T-Cup) device for ACMV LAMP and compared its performance with the conventional method. LAMP reactions were prepared using pre-validated ACMV-specific primers and reaction mix, with amplification results detected colorimetrically with SYBR Green I dye. Each reaction consisted of 10.5 µL of LAMP reaction mix and 3.0 µL of target DNA (total DNA or leaf sap from ACMV-infected cassava, healthy cassava, or nuclease-free water). The results showed that both the thermocycler and T-Cup devices successfully amplified ACMV in reactions using DNA and leaf sap from ACMV-infected cassava, with positive reactions showing a clear color change within 30 minutes. No amplification was observed in healthy cassava and water controls, confirming assay specificity. Results from the T-Cup were consistent with those from the thermocycler, showing that the 3D-printed device can effectively serve as a portable and low-cost alternative for LAMP-based virus detection.

Keywords: Africa cassava mosaic virus (ACMV), Diagnostics, LAMP, 3D-printed, cassava

Session 4: Crop Improvement and Biotechnology (CIB)

Chair: Dr. Melaku Gedil

1. Correlation of Vegetative Traits between Seedling and Mature Rice (*Oryza sativa* L.) Plant
2. Assessment of Genetic Variation in Groundnut (*Arachis hypogaea* L.) Accessions from Togo and South Sudan based on Seed Yield using DarTseq SNP Markers
3. Biotechnological Approaches for Improving Crop Resilience to Climate Change: A Review of Gene Editing and Genomic Selection Strategies
4. Comparison of Two DNA Extraction Methods for Molecular Detection and Sequencing of Pungency Genes in Five Nigerian *Capsicum* Varieties
5. Potential of Host Plant Resistance in the Management of the Cowpea Bruchid (*Callosobruchus maculatus* Fab.)
6. Biocontrol of Postharvest Tuber Rot in *Dioscorea rotundata* Poir. caused by *Lasiodiplodia* spp. using *Trichoderma* and *Syzygium aromaticum* Fruits
7. Relationship Between Bodyweight and Linear Body Measurement of Noiler Chicken
8. In silico Identification and Characterization of Stress-Responsive Genes in Rice Bean (*Vigna umbellata*) for Climate-Resilient Agriculture
9. Genetic Variation for Yield Traits among Common Bean (*Phaseolus vulgaris* L.) Accessions
10. Assessment of Grain Mineral Concentrations in some Accessions of Bambara Groundnut (*Vigna subterranea* (L.) Verdc.)
11. Changes in Pericarp Integrity of Seeds of Shrunken-2 Maize Hybrids stored at Room Temperature
12. Rapid Multiplication of *Maruca vitrata* for Host Plant Resistance
13. Optimization of Polymerase Chain Reaction and Detection of Pungency Associated Genes in some Local Hot Pepper Varieties in Southwest Nigeria
14. RNAi-Mediated Suppression to Inhibit Aphid (*Aphis craccivora* Koch.) Populations and Minimize Virus Transmission in Cowpea (*Vigna unguiculata* L. Walp.)
15. Uncovering Indigenous Diversity in Pigeon pea (*Cajanus cajan*): Insights from Germplasm Exploration, Ethnobotanical Surveys, and Digital Phenotyping for Climate-Smart Breeding
16. Impacts of Drought on Maize Production: Adaptive Responses and Breeding Strategies for Resilience in Sub-Saharan Africa
17. Cytoplasmic Inheritance of Maize (*Zea mays* L.) In Crop Improvement

Correlation of Vegetative Traits between Seedling and Mature Rice (*Oryza sativa* L.) Plant

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Abstract

Selection of seedlings that reliably represent mature plant performance is critical for accelerating rice breeding progress. This study was conducted to evaluate genetic variability, heritability, and trait correlations between seedling and mature stages of rice to provide a basis for early-stage selection. Twelve rice varieties were established in a screenhouse, at three weeks after sowing, three vigorous seedlings per variety were carefully uprooted with intact roots and shoots to obtain seedling data and subsequently nurtured to maturity. The experiment was laid out in a completely randomized design with three replications. All data collected were analysed using SPSS V. 21 software. Significant ($p < 0.01$) mean squares were observed for seedling plant length (SPL), seedling root length (SRL), seedling plant weight (SPW), seedling root branching (SRB), final plant length (PL), and final shoot length (SL). All traits exhibited low genetic coefficient of variation (GCV), with the highest value recorded for seedling plant weight (32.60%). Phenotypic coefficient of variation (PCV) ranged from 16.17% in plant length to 56.85% in root fresh weight. Seedling root length showed significant ($p < 0.01$) negative correlations with mature plant root length ($r = –0.292$) and shoot fresh weight ($r = 0.303$), whereas seedling root branching was positively correlated with root branching at maturity The generally low heritability estimates which ranges from -17.40% to 42.3% observed may be characteristic of some of the varieties, which are expected to display relatively stable performance under defined cultivation conditions. These findings provide useful insights for guiding seedling-based selection strategies in rice improvement programs.

Keywords: Rice, Seedling traits, Matured plant traits, Genetic variability

Assessment of Genetic Variation in Groundnut (*Arachis hypogaea* L.) Accessions from Togo and South Sudan based on Seed Yield using DarTseq SNP Markers

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Abstract

Groundnut (*Arachis hypogaea* L.) production in Nigeria is limited by pests, diseases, drought, and poor soil fertility. Understanding genetic diversity among germplasm is vital for developing resilient and high-yielding varieties. This study assessed 39 groundnut accessions from Togo and South Sudan using agronomic traits and DArTseq SNP markers. The accessions were evaluated across three locations (Ibadan, Ikenne, and Kano) in 2022 using a randomized complete block design with three replications. Analysis of variance (ANOVA) was performed on data for seed yield, pod weight, hundred seed weight, and other traits using R (version 4.1). A total of 4,488 SNPs were generated, with 2,586 high-quality markers retained. Significant ($P < 0.05$–0.001) differences were found among accessions for all traits except days to first flowering, while location effects were significant for all traits except seed length. Accession × location interaction was significant only for seed yield. Principal component and cluster analyses revealed three heterogeneous groups, with hundred seed weight, pod weight, and seed yield contributing most to variation. Accession TGO-AH2021-026 exhibited superior performance in key agronomic traits, suggesting its potential as a valuable parent line for breeding and as a promising cultivar for large-scale cultivation in Nigeria.

Keywords: Groundnut, Genetic variation, Agronomic traits, SNP markers, Breeding.

Biotechnological Approaches for Improving Crop Resilience to Climate Change: A Review of Gene Editing and Genomic Selection Strategies

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Abstract

Climate change poses a significant threat to global food security through extreme weather events, which reduce staple crop yields by up to 3.2% per 1°C temperature rise, threatening soybean, rice, wheat, potato, and maize production. This review evaluates the effectiveness of two methods: gene editing using CRISPR/Cas9 and genomic selection, focusing on their effects on yield under harsh conditions, water-use efficiency, and heat tolerance. Peer-reviewed literature from 2015–2025 was analysed, including field trials and simulations, with inclusion criteria prioritising studies on abiotic stress responses in target crops. The findings showed that CRISPR/Cas9 gene editing in rice improved drought tolerance by 20% through knockout of the *OsERA1* gene, enhancing stomatal closure, while edits to *OsRR22* increased salinity tolerance by 30% via cytokinin signalling. In maize, *ARGOS8* variants led to a 10% increase in yield during droughts. In wheat, modifying *TaMBF1c* improved heat yield by 10–15% through ABA pathway regulation. Genomic selection also accelerated maize drought yield gains by 0.176 t/ha, three times faster than conventional breeding, with prediction accuracies of 0.5 - 0.8 for wheat and rice using GBLUP models. These methods outperformed traditional breeding, improving resilience by 10–20%, though studies on cassava and soybean remain limited. By promoting precise genetic enhancements, gene editing and genomic selection are critical for sustainable agriculture and policy development to ensure food security in the face of climate change.

Keywords: Genomic selection, GBLUP, CRISPR/Cas9, Crop improvement, Climate resilience.

Comparison of Two DNA Extraction Methods for Molecular Detection and Sequencing of Pungency Genes in Five Nigerian *Capsicum* Varieties

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Abstract

Previous studies on Nigerian *Capsicum* species focused on the molecular mechanisms of capsaicinoid biosynthesis, however, there is limited literature available on the molecular analysis of Nigerian hot peppers. Hence, the aim of this study is to find out which method is best for the extraction of nucleic acid of the indigenous Capsicum varieties as well as sequencing the pungency genes in the varieties of interest. The seeds and mesocarps of the Capsicum varieties namely: *C. frutescens* var *chacoense*, long *C. frutescens* var *minima*, big and small *C. chinense* var *habanero*, *C. frutescens* var *baccatum*, dry *C. frutescens* var *fingerh* were used for the research. The gDNA of the seed and mesocarp of each specimen were extracted with cetyltrimethylammonium bromide (CTAB) and NIMR gDNA extraction kit respectively. The concentration and absorbance of the gDNA were measured using a nanodrop spectrophotometer. Agarose gel electrophoresis was conducted after DNA extraction and each PCR. The PCR products were sequenced and analyzed. BLAST and phylogenetic analyses of the amplified gene sequences revealed that the local pepper varieties contained pungency related genes homologous to the acyltransferase (AT3) and Capsicum acyltransferase (CATF1) genes. The A260:A280 ratio ranged from 1.17 to 1.77 for the samples extracted via the NIMR kit and 1.74 to 1.43 for the DNA samples extracted using the CTAB method. This study has established that the CTAB protocol is a preferred method for DNA extraction from peppers and that the local hot pepper varieties contain pungency-related genes homologous to the AT3 and CATF1 genes, as revealed by the bioinformatics analyses.

Keywords: Sequencing, extraction, molecular detection, pungency.

Potential of Host Plant Resistance in the Management of the Cowpea Bruchid (*Callosobruchus maculatus* Fab.)

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Abstract

Cowpea (*Vigna unguiculata* L. Walp) is a vital source of protein and micronutrients in sub-Saharan Africa, yet post-harvest losses of up to 90% occur due to infestation by the cowpea bruchid (*Callosobruchus maculatus*). Although synthetic insecticides effectively manage bruchids, their health risks, environmental impact, and high cost necessitate safer, sustainable alternatives. Host Plant Resistance (HPR) provides an eco-friendly, farmer-compatible strategy for sustainable pest control. This review synthesizes current progress in developing resistant germplasm, emphasizing varieties such as TVu 2027, TVu 11952, and IT81D-1032 that reduce progeny emergence by 70–100%, delay larval development, and maintain seed viability. Literature search was conducted across Google Scholar, PubMed, ResearchGate, and ScienceDirect using keywords related to cowpea resistance mechanisms, molecular breeding, and omics studies, compiling 83 articles from 2020–2025. Advances in molecular and genetic engineering, including incorporation of the α-amylase inhibitor-1 (αAI-1) gene, have achieved near-complete resistance without yield penalties. Integration of metabolomics, transcriptomics, and Artificial Intelligence (AI) enhances breeding precision, while introgression from wild relatives expands the genetic base for durable resistance. HPR, when integrated with safe storage and IPM strategies, can substantially reduce post-harvest losses, improve resilience, and enhance food and nutritional security across sub-Saharan Africa.

Keywords: Cowpea, Host plant resistance, *Callosobruchus maculatus.*

Biocontrol of Postharvest Tuber Rot in *Dioscorea rotundata* Poir. caused by *Lasiodiplodia* spp. using *Trichoderma* and *Syzygium aromaticum* Fruits

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Abstract

Dioscorea rotundata is a staple crop for food security in Africa; however, significant yield losses have been reported due to microbial-induced rot (*Lasiodiplodia* sp.). Previous studies explored individual effects of beneficial microbes and botanicals; their synergistic effects remain unexplored. This study evaluated *in vivo* biocontrol of *Syzygium aromaticum*, *Trichoderma harzianum* and *T. atroviride* extracts against *Lasiodiplodia* sp. Diseased *D. rotundata* tubers obtained from Bodija market were cultured on Potato Dextrose Agar. Healthy white yam tubers from IITA were sterilized and treated with *S. aromaticum* hexane extracts (SaH) and *Trichoderma* ethyl acetate extracts (Tri2E, Tri3E) at 1, 0.5, 0.25 mg/ml concentrations in a completely randomised design with three replicates over two months. Mancozeb and Wood ash served as controls. Rot severity and weight loss were determined. Data were analysed using descriptive statistics and ANOVA at $P<0.05$. Seven isolates were identified- *L. theobromae* (5), *L. venezuelensis* and *L. hormozyganensis* and deposited in GenBank (PV446413-PV446419). Mancozeb showed the highest reduction in rot (80.4%), followed by Wood ash (60.0%), while SaH+Tri2E+Tri3E combinations achieved moderate reductions (50.0%). SaH effectively minimised weight loss (15.2%) compared to Wood ash (16.0%) and Mancozeb (19.0%). These findings suggest that the combined use of *S. aromaticum* and *Trichoderma* extracts provides a sustainable biocontrol alternative that reduces postharvest losses and enhances the food security of *D. rotundata* in Africa.

Keywords: *Dioscorea rotundata*, postharvest rot, *Trichoderma*, *Syzygium aromaticum*, food security.

Relationship Between Bodyweight and Linear Body Measurement of Noiler Chicken

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Abstract

Noiler chicken, a dual-purpose breed, requires reliable body weight prediction from linear body measurements to support selection and productivity improvement. This study examined the relationship between body weight and linear body measurement of Noiler chickens. A total of 117 birds (68 males and 49 females) from day-old to 16 weeks of age were used. Body weight was taken weekly, while body length (BL), keel length (KL), body girth (BG), drumstick length (DS), wing length (WL), shank length (SL), and thigh length (TL) were measured fortnightly. Data were analyzed using SPSS. Pearson's product moment correlation was used to determine the relationship between body weight and linear body measurement, while regression analysis was employed to develop predictive models. All linear body measurements showed strong, positive and significant ($P<0.01$) correlations with body weight. Coefficients of determination (R^2) ranged from 0.850 to 0.919, with body girth as the best predictor. The high R^2 values observed, confirmed that regression equations can effectively predict body weight of Noiler chickens, with multiple regression models providing greater accuracy than simple regression models. The study concludes that all linear body measurements are reliable criteria for early selection and body weight prediction in Noiler chickens, thereby supporting breeding and management decisions

Keywords: Noiler chicken, bodyweight, linear measurements, correlation, predictive regression models

In silico Identification and Characterization of Stress-Responsive Genes in Rice Bean (*Vigna umbellata*) for Climate-Resilient Agriculture

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Abstract

Abiotic stress tolerance in plants is regulated by a complex network of genes involved in dehydration, heat, and hormone-mediated responses. Amongst all, drought remains a critical stress that threatens worldwide agricultural production. Rice bean (*Vigna umbellata)* is a nutritionally rich but underutilized orphan crop, with no comprehensive study on its molecular characterization to identify drought-responsive genes. This study employed a bioinformatics approach to identify and characterize drought-responsive protein-coding genes in rice bean. Four drought-responsive genes, Dehydration-Responsive Element-Binding Protein (DREB2A2), Heat Shock Protein 70 *(*HSP70), Late Embryogenesis Abundant Protein (LEA), and 9-cis-Epoxycarotenoid Dioxygenase (NCED), were retrieved from soybean (*Glycine max*) and used to identify their homologs in rice bean. The identified homologs were analyzed through multiple sequence alignment and phylogenetic analysis, confirming evolutionary conservation and close relationships with known drought-tolerance genes in other legumes. Functional annotation using Gene Ontology showed that DREB2A2 is involved in DNA binding and positive regulation of transcription during stress. HSP70 was associated with ATP binding and ATPase activity, playing a role in protein stabilization under stress. LEA was linked to abscisic acid (ABA) response and cytosolic localization, while NCED catalyzes ABA biosynthesis in plastids, acting upstream in drought signaling. Three-dimensional protein models were predicted using Swiss-Model, confirming structural integrity, domain architecture, and potential functionality of these genes. This study highlights the functional diversity and interplay of these genes in drought tolerance, identifying them as potential targets for breeding and biotechnological strategies to enhance rice bean resilience.

Keywords: *Vigna umbellata*, drought tolerance, bioinformatics, stress-responsive genes, comparative genomics

Genetic Variation for Yield Traits among Common Bean (*Phaseolus vulgaris* L.) Accessions

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Abstract

Common bean is a vital legume widely cultivated in Nigeria, contributing an estimated 1.3 million metric tonnes annually, with most production concentrated in northern states like Kano, Kaduna, and Katsina. Despite being a staple crop, its yield can be constrained. This study aimed to evaluate the genetic variations in yield traits of 20 common bean accessions from Burundi. The seeds were collected from the Genetic Resources Centre (GRC), International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria, and field experiment conducted at the IITA Kano station. The experimental design was Randomized Complete Block Design (RCBD) with three replications. Data on phenological and yield (pod and seed) traits were collected. Significant differences were observed among the accessions for the traits except first flowering date (FFD). The Pearson's correlation showed that there were significant and positive correlations between first flowering date (FFD) and days to first podding (DFP) (r = 0.73); number of pods per plant (NPP) and seed weight per plant (SWPL) (r = 0.86); and locules per pod (LP) and number of seeds per pod (NSP) (r = 0.86). The dendrogram grouped the 20 accessions into two main clusters while the principal component analysis indicated two principal components which explained approximately 60.2% of the total variation in the accessions. Phenological traits (DFP, FFD) showed a negative association with yield traits. TPv-775, TPv-886, TPv-902 and TPv-948 were identified as high-yielding. Generally, the common bean accessions had ample genetic variations which aids breeders in selection, and developing high-yield varieties.

Keywords: Genetic variation, common bean, yield traits, phenological traits

Assessment of Grain Mineral Concentrations in some Accessions of Bambara Groundnut (*Vigna subterranea* (L.) Verdc.)

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Abstract

Bambara groundnut (*Vigna subterranea* (L.) Verdc.) is an underutilized African legume with great potential to enhance food and nutrition security, particularly under changing climatic and soil conditions. This study evaluated the mineral composition of ten accessions of Bambara groundnut to identify nutrient-rich genotypes for sustainable utilization. Ten accessions were obtained from the Genetic Resources Centre of the International Institute of Tropical Agriculture (IITA), Ibadan, Nigeria. They were analyzed at the Central Laboratory, Federal University of Agriculture, Abeokuta. Seeds were sun-dried, ground, oven-dried, and digested using perchloric and nitric acids in an Auto-Kjeldahl K-370 unit. Mineral elements (Ca, Mg, K, Na, Mn, Fe, Cu, Zn, Pb) were analyzed using atomic absorption spectrophotometry, while phosphorus (P) was analyzed spectrophotometrically. Analysis of variance (ANOVA) revealed highly significant ($p < 0.01$) differences among accessions for most minerals, indicating genetic variability. Accession TVSu-398 showed the highest concentrations of Ca, Mg, K, and Na. TVSu-1922 recorded the highest Fe content; and TVSu-261 had superior Zn levels. Positive correlations (e.g., Ca-Mg, r = 0.60; Mn-Zn, r = 0.64) suggest synergistic mineral uptake, whereas negative associations (e.g., P-Pb, r = -0.71) indicate competitive absorption. These results demonstrate the influence of genotype and soil nutrient dynamics on mineral accumulation. The observed variation provides a foundation for selecting and breeding nutrient-rich Bambara groundnut lines. The study concluded that accessions TVSu-398, TVSu-1922, TVSu-2063, and TVSu-261 are nutritionally superior. They can serve as potential parental lines for biofortification and breeding programs aimed at improving grain mineral content, promoting dietary quality, and supporting food and nutrition security in sub-Saharan Africa.

Keywords: Bambara groundnut, mineral composition, phenotypic variation, biofortification, food security

Changes in Pericarp Integrity of Seeds of Shrunken-2 Maize Hybrids stored at Room Temperature

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Abstract

Maize cultivars (*Zea mays* L.) carrying the *shrunken-2 (sh-2)* gene exhibit poor germination and rapid viability loss during storage which is often linked to pericarp deterioration. This study investigated changes in pericarp integrity of *sh-2* maize hybrids stored for varying durations and identified hybrids maintaining high viability after extended storage. Seeds of 22 *sh-2* maize hybrids, produced from six inbred lines in September 2022, were dried and stored in desiccators. Electrical conductivity (EC) of seed leachate was measured at four storage periods, while germination tests were conducted at two time points. Data were subjected to ANOVA, and means were separated using Duncan's multiple range test. Correlation analysis assessed relationships among EC values across storage periods and between EC and germination percentage. Averaged over crosses, EC increased from 0.9µS/cm/g at six months to 789.9µS/cm/g at seventeen months. No germination was observed for seventeen months old seeds. The eleven months old seeds had germination which ranged from 0-82.5% and EC ranged from 72.4µS/cm/g- 205. 1µS/cm/g. The three crosses with the lowest conductivity values were UI Gen 2× UI Gen 3, UI Gen 2× UI Gen 7, and UI Gen 2× UI Gen 4. The germination percentages for the crosses were 60%, 82.5%, and 42.5%, respectively. Germination percentage correlated negatively with EC (r = -0.62). Rapid viability loss occurred after thirteen months of seed storage. UI Gen 2 as a female parent showed good combining ability for maintaining seed viability.

Keywords: *shrunken-2* gene, pericarp integrity, seed viability, electrical conductivity, germination, seed leachate, combining ability.

Rapid Multiplication of *Maruca vitrata* for Host Plant Resistance

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Abstract

Cowpea (*Vigna unguiculata* L. Walp.) is a vital legume crop in sub-Saharan Africa and Asia, providing affordable protein, essential micronutrients, and income for millions of smallholder farmers; however, its productivity is heavily threatened by the legume pod borer, *Maruca vitrata* (Lepidoptera*: Crambidae*), which causes 20–80% yield losses by attacking flower buds, flowers, and pods, rendering chemical control costly and often ineffective. Host plant resistance (HPR) has emerged as a sustainable and environmentally friendly strategy within integrated pest management, although its success relies on efficient insect screening, which requires continuous and reliable *M. vitrata* supply. Traditional rearing methods using flowers and pods are season-dependent and labor-intensive, but recent advancements—especially the use of sprouted cowpea as a continuous feeding substrate—have enabled rapid multiplication of *M. vitrata*, enhancing larval survival, lowering rearing costs, and enabling large-scale colony establishment. Additionally, artificial diets and trait-based resistance screening involving pod-wall thickness, trichome density, and phenolic content have improved precision in evaluating resistant genotypes. This transition from flower- and pod-based rearing to sprouted cowpea substrates marks a major innovation that ensures year-round insect availability, accelerates resistance screening, supports breeding pipelines, and ultimately contributes to enhanced cowpea productivity and food security in cowpea-growing regions.

Keywords: *Maruca vitrata*; host plant resistance; sprouted cowpea; resistance screening

Optimization of Polymerase Chain Reaction and Detection of Pungency Associated Genes in some Local Hot Pepper Varieties in Southwest Nigeria

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Abstract

Capsicum, commonly known as peppers, was conducted to optimize polymerase chain reaction to detect the presence of pungency encoding genes of twelve local hot pepper varieties of *Capsicum* in Southwest Nigeria. The genomic DNA of the seeds, fruits and mesocarp of each *Capsicum* species were extracted using the CTAB method. The (PCR) was optimized with two primers (acyltransferase (AT3) and *Capsicum* acyl-transferase (CATF1) and the best PCR conditions were applied to amplify the pungency gene in the extracted DNA. The concentration of the gDNA was highest (1.88 ng/µL) in mesocarp of *C. annuum* var *annuum* but lowest (1.02 ng/µL) in seeds of *C. frutescens* var *finger*, small. There were visible PCR products in the gel after electrophoresis with band size (70-200 bp) for AT3 and (80 bp) for CATF1. This study has established that CTAB protocol is a reliable and widely used method for DNA extraction from pepper and the presence of pungency gene(s) homologous to acyl-transferase (AT3), *Capsicum* acyltransferase (CATF1) genes in the tested local hot pepper varieties in Southwest Nigeria. Optimization PCR was carried out with an initial denaturing step of 5 min at 95˚C, followed by 30 cycles with final denaturation at 95˚C for 30 seconds. The annealing temperature at 55˚C for 30 seconds and an initial extension at 72˚C for 45 seconds. A final extension step was performed at 72˚C for 7 minutes.

Keywords: Pungency, *Capsicum*, AT3, CATF1, PCR optimization

RNAi-Mediated Suppression to Inhibit Aphid (*Aphis craccivora* Koch.) Populations and Minimize Virus Transmission in Cowpea (*Vigna unguiculata* L. Walp.)

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Abstract

Cowpea (*Vigna unguiculata* L. Walp.) is one of the most important legume crops cultivated globally for its protein-rich seed. However, cowpea production is significantly threatened by virus diseases, especially aphid-transmitted viruses such as Bean common mosaic virus-blackeye (BCMV), Cowpea aphid-borne mosaic virus (CABMV), and Cucumber mosaic virus (CMV), which are endemic in Nigeria. *Aphis craccivora* (Insecta: *Aphididae*) is a principal vector of multiple viruses and the cowpea pest. Collectively, viruses and aphids affect cowpea growth and reduce yields, contributing to economic losses. The overuse of chemical sprays to manage cowpea aphids has a significant negative impact on human and environmental health, hence the need for more eco-friendly and sustainable methods. RNA interference (RNAi)-based pest suppression has emerged as a promising option for managing insect pests and plant viruses by
silencing essential genes in target organisms. This study will explore the potential of RNA interference (RNAi) by identifying suitable targets for RNA-induced silencing of essential metabolic genes of *Aphis craccivora* to inhibit the growth and population to control virus transmission and pest feeding damage on cowpea by dsRNA constructs conveyed via nano-formulations on host plants. The impact of dsRNA-mediated gene silencing on aphid survival, reproduction, feeding behaviour and virus transmission will be assessed. The findings from this study are expected to contribute to an environmentally safe management strategy in cowpea production.

Keywords: Cowpea, RNA interference, dsRNA, Aphids, Gene silencing

Uncovering Indigenous Diversity in Pigeon pea (*Cajanus cajan*): Insights from Germplasm Exploration, Ethnobotanical Surveys, and Digital Phenotyping for Climate-Smart Breeding

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Abstract

Pigeon pea (*Cajanus cajan* [L.] Millsp.) remains an underutilized legume in most African countries despite its potential for climate-resilient farming systems, food diversification, and nutritional value. Limited knowledge of its indigenous diversity and farmer trait preferences constrains wider adoption, particularly in the West African sub-region. Between February and June 2025, a germplasm exploration was conducted across 18 Nigerian states, complemented by accessions from the IITA genebank, Ghana, the Republic of Benin, and the Gambia, bringing the total to 273 accessions. Ethnobotanical surveys captured farmers' preferences, cultural uses, and local nomenclature while seed morphometric traits were assessed using Videometerlab4 multispectral imaging. Farmer surveys revealed cooking time (58.3%), commercial value (27.0%), and maturity cycle (14.7%) as preferred varietal traits. Gender and age differences were evident; women and older farmers prioritized cooking time, while men and youth emphasized the maturity cycle as a preferred trait. Morphometric analyses revealed moderate variability in seed size, shape, and pigmentation. Seed area (14.2 – 46.0 mm^2), compactness (0.590 – 0.998), and eccentricity (0 – 0.808) differentiated round from elongated seeds, while CIELab_A values (- 0.04 - 29.98) captured pigmentation differences. The first two PCA axes explained 67.1% of total variation, and cluster analysis grouped accessions into four morphotypes. By integrating genetic and morphometric information, as well as farmer varietal preference insights, this study provides a robust foundation for the conservation and development of climate-resilient, fast-cooking, and market-preferred varieties for sub-Saharan Africa.

Keywords: Pigeon pea, underutilized legume, germplasm exploration, diversity, plant genetic resources, farmer preferences.

Impacts of Drought on Maize Production: Adaptive Responses and Breeding Strategies for Resilience in Sub-Saharan Africa

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Abstract

Maize (*Zea mays* L.) is a critical staple crop worldwide, especially in Sub-Saharan Africa (SSA), where it plays a key role in food security and livelihoods. However, its production is severely constrained by drought, which is on the increase with time due to climate change. Drought negatively impacts both vegetative and reproductive stages, leading to substantial yield losses. Conventional breeding methods based on phenotypic selection have contributed to maize improvement, but their effectiveness is limited for complex traits, like drought tolerance, which are strongly influenced by environmental variability. As a result, genomic-assisted breeding has become a valuable complementary strategy, allowing complex traits to be broken down into their genetic components through development of inbred lines and identifying quantitative trait loci (QTLs) with the help of molecular markers. This approach enhances selection accuracy, shortens breeding cycles, and facilitates the targeted development of drought-resilient high-yielding varieties. Collaborative initiatives, notably by institutions such as CIMMYT and IITA, have successfully applied these tools in developing improved varieties like Drought Tolerant Maize for Africa (DTMA) and Water Efficient Maize for Africa (WEMA). These varieties are widely adopted across SSA, helping smallholder farmers mitigate drought-induced yield losses while contributing to poverty reduction and food security. Modern breeding initiatives are increasingly focusing on tolerance to combined abiotic stresses, like combined heat and drought, combined drought and salt and combined drought and acidity stresses, promoting a comprehensive and sustainable strategy to address future challenges in maize production.

Keywords: Maize, Drought, QTL, Inbred lines, Sub-Saharan Africa

Cytoplasmic Inheritance of Maize (*Zea mays* L.) In Crop Improvement

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Abstract

Cytoplasmic inheritance plays a crucial role in improving maize and forms the foundation of effective hybrid and drought-tolerant breeding programs. Variations within mitochondrial and chloroplast genomes influence critical physiological and reproductive traits, including pollen fertility, energy metabolism, and stress adaptation. This review synthesizes recent advances on the effects of cytoplasmic inheritance in maize, integrating classical morphological evaluations with molecular analyses of mitochondrial gene rearrangements, chloroplast DNA variation, and restorer-of-fertility (Rf) genes. Statistical tools such as variability coefficients, correlation analysis, and principal component analysis are discussed for interpreting cytoplasmic–nuclear interactions. Emerging technologies CRISPR-Cas9, genomic selection, and transcriptomics are explored for accelerating cytoplasmic trait introgression and improving hybrid efficiency. By consolidating current knowledge, the review underscores the strategic role of cytoplasmic systems, particularly cytoplasmic male sterility, in enhancing hybrid seed production, reducing breeding costs, and strengthening resilience under drought stress. It further emphasizes the application of cytoplasmic inheritance in Nigeria's maize improvement programs and its contribution to regional food security. This comprehensive analysis provides a foundation for future research and the deployment of cytoplasmic diversity in sustainable maize breeding.

Keywords: Cytoplasmic inheritance, Maize (*Zea mays*), cytoplasmic male sterility, drought tolerance, hybrid breeding.

Session 5: Climate-Smart Value Chains and Agribusiness Opportunities (CVCA)

Chair: Dr. Mercy Diebiru-Ojo

1. Beyond Spraying: Experimental evidence on how training and market access drive willingness to pay for improved pest management services in Nigeria
2. Benefits and constraints of value actors of Biofortified Vitamin A Cassava in Nigeria
3. Fisheries Value Chains in Nigeria: Governance, Sustainability, and Climate-Smart Perspectives
4. Economic analysis of cashew farming systems in Nigeria: towards climate-resilient livelihoods

Beyond Spraying: Experimental evidence on how training and market access drive willingness to pay for improved pest management services in Nigeria

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Abstract

In this paper, we examine how Good Agricultural Practices (GAP) training and market access interventions causally affect farmers' willingness to pay for bundled pest management services. Using a three-arm cluster randomised controlled trial with 1,682 tomato farmers in Kano State, Nigeria, we employed Becker-DeGroot-Marschak auctions to elicit incentive-compatible willingness to pay measures for three complementary services: professional spraying, pest identification, and market linkage assistance. Treatment groups received either GAP training alone (T_1) or GAP training combined with market linkage support (T_2), compared to control conditions. Our results revealed striking heterogeneity across service types and treatment modalities. T_2 significantly increases willingness to pay for spraying services by 1,004 NGN per year (28% increase) whilst T_1 shows smaller, non-significant effects (471 NGN). Both treatments generate positive effects on linkup services, with T_2 producing larger impacts (580 NGN) than T_1 (352 NGN). Pest identification services show minimal treatment responses across interventions, suggesting strong farmer preferences for bundled service delivery over standalone technical offerings. Quantile regression analysis reveals treatment effects concentrated among farmers in upper quantiles of the willingness to pay distribution, indicating interventions primarily benefit those with existing capacity rather than the most constrained. Heterogeneity analysis demonstrates larger effects among farmers operating irrigated production systems, reflecting enhanced capacity to benefit from professional services. The results suggest sustainable scaling of professional pest management services requires integrated approaches combining technical training with market access support, whilst recognizing the need for differentiated strategies to reach resource-constrained farmers.

Keywords: pest management, willingness to pay, randomized controlled trial, agricultural services, Nigeria

Benefits and constraints of value actors of Biofortified Vitamin A Cassava in Nigeria

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Abstract

Biofortified varieties of cassava (VAC) are potential vehicles to reducing the prevalence of micronutrients deficiency among vulnerable population. However, little is known on the benefits and constraints faced by the different categories of value chain actors (VCAs) on the postharvest handling (PHH) of VAC thus limiting goals of biofortification. Understanding benefits and constraints faced by VCAs on VAC will help make biofortification sustainable. The study therefore investigated VCAs benefits and constraints faced on VAC in Nigeria. A mixed method sampling procedure was used to sample 289 processors, 390 marketers and 277 consumers across selected states where VAM was first introduced namely, Anambra, Imo, Kaduna, Kano, Niger, Osun, Oyo in Nigeria to give a total of 956 respondents. Semi-structured interview schedule was used to collect quantitative data on respondents' personal characteristics (sex, age, annual income), perceived benefits and constraints faced on PHH of VAC and focus group discussions were used for qualitative data. Quantitative data were analysed using descriptive statistics while qualitative data with thematic procedures. The VCAs were mostly Male (52.9%) aged 45.7± 10.3 and majority are low-income earners (72.2%), with an earning of N1,139,946.00 pa. Health benefits ranked highest for benefit derived from PHH of VAC by each category of the VCAs. Low preference for VAC constrained the processors and marketers while the lack of interest in VAC for the consumers. The study concluded that understanding VCAs benefits and constraints faced on the PHH of PAM will increase the attainment and sustainment of the biofortification goals.

Keywords: Value chain actors, Vitamin A cassava, Benefits, Constraints

Fisheries Value Chains in Nigeria: Governance, Sustainability, and Climate-Smart Perspectives

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Abstract

Despite Nigeria's abundance of inland and marine water resources, the fisheries and aquaculture sector is constrained by overfishing, poor governance, high feed prices, postharvest losses, and dependency on imports. Previous studies revealed these inefficiencies but often ignore how value chain bottlenecks, governance, and climate stressors interact to limit growth, especially in the marine ecology. Using a mixed-methods approach and the Fisheries Sector Assessment Toolkit (FSAT), this study fills the gap by evaluating governance, economic performance, sustainability, social aspects, and value chain dynamics in the entire Nigeria's fisheries and aquaculture sectors. Field surveys comprising 18 Focused Group Discussions (FGDs) and 101 Key Informant Interviews (KIIs) were conducted in three major coastal fishing states of the country alongside consultations with stakeholders from 14 states. Findings indicate that marine and freshwater capture fisheries are experiencing stock declines due to overfishing, pollution, habitat destruction, and illegal, unreported, and unregulated fishing. High feed costs, poor quality brood stock, and disease issues hindered aquaculture growth. Processing relies mainly on traditional methods, resulting in postharvest losses of 15-60%, largely due to inadequate cold chain systems. Marketing is constrained by price instability and poor logistics, while fresh fish was majorly consumed in the Southern Nigeria, smoked and dried local fish products dominate consumption in the Northern zone. Outdated regulations, inadequate enforcement, and ineffective institutions aggravate these weaknesses. The study concludes that incorporating climate-smart practices, strengthening institutions and adopting adaptive governance are critical for ensuring resilience and sustainability within the Nigeria's blue economy framework.

Keywords: Fisheries and aquaculture sector, governance, aquaculture value chain, postharvest losses, climate-smart practices.

Economic analysis of cashew farming systems in Nigeria: towards climate-resilient livelihoods

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Abstract

Cashew farming is a major source of income and food security for smallholders in Nigeria, but production faces challenges from climate variability, market risks, and declining soil fertility. Diversified farming systems such as intercropping and livestock integration have been recognized as strategies that not only improve profitability but also strengthen climate resilience by spreading risks, enhancing resource use efficiency, and stabilizing livelihoods. The objectives of this study involve identifying the systems adopted, comparing their profitability indicators, and examining the factors influencing system choice. A multistage sampling procedure was used to select 151 cashew farmers, and data were collected through structured surveys and interviews. Descriptive statistics, gross margin and return-on-investment analyses, and a multinomial logistic regression model were applied. Results show that cashew–livestock integration was the most widely adopted system (46.4%), followed by intercropping (41.7%) and monocropping (11.9%). Profitability analysis revealed that mixed farming yielded the highest net income (₦920,763.1), return on investment (0.81), and benefit–cost ratio (1.81), underscoring its superior financial viability and adaptive potential. Intercropping was also profitable (ROI 0.65), offering diversification benefits, while monocropping provided the lowest returns (ROI 0.62). Regression results indicated that age, education, farming experience, marital status, and access to credit significantly influenced system choice, with experienced and credit-accessible farmers more likely to adopt diversified practices. The study concludes that integrated cashew farming systems enhance both profitability and climate risk adaptation, and recommends policies that strengthen extension services, input support, and youth participation to promote diversified systems in Nigeria.

Keywords: Mixed farming, Intercropping, Monocropping, Profitability, Return on investment, Farming systems, Multinomial logit model

Session 6: Food Processing, Nutrition & Food Safety (FPNFS)

Chair: Dr. Mercy Lung'aho

1. Development and Evaluation of the Impact of Vegetable Fortification on Safe-Sorghum Based Products
2. Optimisation and Bioactive Characterisation of Moringa–Bambara Groundnut–Maize Composites for Functional Food Applications
3. Effects of Solvent-partitioned Fractions of *Cola acuminata* Seed on Some Glucose-metabolizing Parameters in Streptozotocin-induced Diabetic Rats
4. Data Generation of the Safety of Yam, Cassava, and Plantain Products sampled from Informal Systems in Oyo State, Nigeria
5. Chemical and functional properties of composite flour from High quality cassava flour(*Manihot esculenta crantz*), Sprouted sorghum(*Sorghum bicolor*) and Fermented African yam bean(*Sphenostylis stenocarpa*)
6. Coping Mechanisms with *Tuta absoluta*: Determinants and Effect on Food Security Status of Tomato Farmers in Kano State
7. Effects of Variety and Fertilizer Type on Physico-Chemical Composition of Sweet Corn (*Zea Mays L. Saccharata Sturt*) Kernel
8. Consumer Awareness of Veterinary Drug Residues in Livestock Products
9. Antibiotic Use in Poultry Production in Akure, Ondo State
10. Effect of Soaking on the Vitamins and Functional Properties of Pawpaw (*Carica Papaya*) Seeds
11. Optimisation of Conditions for Lipase Production Using Fungal Isolates Obtained from Oily Substances
12. Inhibitory Efficacy of Turmeric Powder and Palm Oil on Fungal Flora from Processed Cassava Flake

Development and Evaluation of the Impact of Vegetable Fortification on Safe-Sorghum Based Products

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Abstract

Sorghum is a widely consumed staple in Nigeria, but its limited nutrient profile may contribute to malnutrition. This study evaluated the nutritional composition, sensory attributes, and consumer acceptance of sorghum fortified with vegetables. Seven samples were formulated, Sample A (75:15:10, sorghum:ewedu:pumpkin leaves), Sample B (70:15:15), Sample C (70:20:10), Sample D (75:15:10, sorghum:okra:green amaranth), Sample E (70:15:15), Sample F (70:20:10), and a control (Sample G, 100% sorghum). A structured questionnaire captured socio-demographic data, dietary habits, and nutritional knowledge of 40 participants, while laboratory analyses assessed proximate, phytochemical, and micronutrient compositions. Sensory evaluation and consumer acceptance were conducted using a 9-point hedonic scale. Most respondents were aged 26–45, predominantly female (60%), Yoruba (70%), and tertiary educated (60%). Green amaranth was most frequently consumed, with 70% reporting intake 2–3 times weekly. Awareness of vegetable-fortified sorghum was low (77.5% unaware), but 40% strongly supported its incorporation into staple foods. Nutrient analyses showed significant ($p<0.05$) improvements in protein, fat, fibre, ash, and micronutrients across fortified samples compared to the control. Sample B had the highest crude protein (11.83%) and phytochemical content, while Sample F contained the highest calcium (0.285%), magnesium (0.297%), potassium (0.724%), iron (54.10 mg), zinc (14.20 mg), and manganese (13.60 mg). Sensory evaluation showed strong acceptability, with Sample A rated highest overall (7.95). Consumer willingness to purchase was strongest for Samples B and D (60% each). In conclusion, fortifying sorghum with vegetables improved nutritional quality, phytochemical profile, and consumer acceptance, demonstrating potential for combating nutrient deficiencies through culturally familiar, affordable foods.

Keywords: Food fortification, consumer acceptability, sensory evaluation, sorghum, vegetables.

Optimisation and Bioactive Characterisation of Moringa–Bambara Groundnut–Maize Composites for Functional Food Applications

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Abstract

Non-communicable diseases including, type 2 diabetes, cardiovascular disorders, and obesity are escalating globally, driving interest in functional foods that provide health benefits beyond basic nutrition. This study developed composite flours from *Moringa oleifera* leaf powder, Bambara groundnut, and yellow maize to enhance nutritional, phytochemical, and functional properties relevant to metabolic health. Crop ratio ranges were identified and optimised using Design Expert software. A central composite design generated 15 experimental runs, and response surface methodology identified three optimal blends predicted to yield the highest bioactive potential. The optimised formulations contained Moringa (8.07–11.24%), Bambara groundnut (23%), and maize (45–61%). Compared to 100% maize flour, the composites showed higher protein (16.23–17.57%), fibre (2.70–3.24%), and ash (2.92–3.77%) contents. Bioactive compounds were significantly enriched, including phenolics (2.67–2.77 mg GAE/g), flavonoids (1.15–1.28 mg QE/g), and tannins (4.93–5.96 mg/g). Antioxidant activity improved across assays, with lower SC_{50} values for DPPH (1.24–4.04 mg/mL) and ABTS (4.29–11.12 mg/mL), and enhanced ferric reducing antioxidant power (2.21–2.46 mmol Fe^{2+}/g). Enzyme inhibition studies showed strong inhibition of α-amylase (IC_{50}: 3.47–4.48 mg/mL) and α-glucosidase (1.17–2.05 mg/mL), indicating glycaemia-modulating potential. Increased amylose (24.09–27.63%) and reduced soluble sugar (3.66–5.26%) further suggested improved starch quality and lower glycaemic impact. These results demonstrate that Moringa–Bambara–maize composites are nutritionally enriched and biofunctionally superior to maize flour alone. The optimised blends hold significant promise as functional food ingredients to mitigate oxidative stress, regulate postprandial glycaemia, and address micronutrient deficiencies in maize-dependent populations.

Keywords: Moringa-Bambara groundnut-maize, non-communicable disease, Functional foods, optimised formulation

Effects of Solvent-partitioned Fractions of *Cola acuminata* Seed on Some Glucose-metabolizing Parameters in Streptozotocin-induced Diabetic Rats

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Abstract

Diabetes mellitus, a decade-long metabolic disease symptomized by high fasting blood glucose concentration posing major health challenge. Based on folklore reviews, *Cola acuminata* a snack for entertainment is used for management of diabetes. However, this has not been scientifically validated. Therefore, this research aimed at assessing antihyperglycaemic potentials of n-hexane, n-butanol and ethylacetate-partitioned fractions of *Cola acuminata* seed in streptozocin-induced diabetic rats. Determination of effects of these partitioned fractions on serum insulin and hepatic glycogen concentrations; the glucose-6-phosphatase, fructose-1,6-bisphosphatase, glycogen phosphorylase, hexokinase and glucose-6-phosphate dehydrogenase activities were assessed. Data were analyzed with one-way analysis of variance (ANOVA) using GraphPad Prism version 6.0. This research findings indicated that treatment of streptozotocin-induced diabetic rats with n-hexane, n-butanol and ethylacetate-partition fractions of *Cola acuminata* seed showed promising efficacies by significantly ($P < 0.05$) alleviating the increased fasting blood glucose concentration of streptozotocin-induced diabetic rats and significantly ($P < 0.05$) increasing hepatic hexokinase and glucose-6-phosphate dehydrogenase activities likewise the hepatic glycogen and serum insulin concentrations but significantly ($P < 0.05$) decrease glucose-6-phosphatase, fructose-1,6-bisphosphatase and glycogen phosphorylase activities in streptozotocin-induced diabetic rats. Hence, it was concluded that the n-hexane, n-butanol and ehtylacetate-partitioned fractions of *Cola acuminata* seed has antihyperglycaemic efficacies via inhibition and downward regulations of some key glucose anabolic parameters such as glucose-6- phosphatase, fructose-1,6-bisphosphatase and glycogen phosphorylase activities and activation or stimulation of some key glucose catabolic parameters such as hepatic hexokinase and glucose-6-phosphate dehydrogenase activities; serum insulin and hepatic glycogen concentrations.

Keywords: Diabetes mellitus, *Cola acuminata*, Streptozotocin, antihyperglycaemic, partitioned-fractions

Data Generation of the Safety of Yam, Cassava, and Plantain Products sampled from Informal Systems in Oyo State, Nigeria.

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Abstract

Cassava, plantain, and yam are important for food and nutrition security in Africa providing high caloric value and income. Fungal, aflatoxin, and pesticide residue contaminations were assessed in 198 samples from postharvest value chain actors. Fungi were isolated on Potato Dextrose Agar, aflatoxin concentrations determined with Thin Layer Chromatographic and CAMAG densitometer, and pesticide residue concentrations determined using High Performance Liquid Chromatography with a diode array detector. Liver cancer risk assessment was estimated from aflatoxin B1 concentrations. Fungi isolated included, *Absidia*, *Aspergillus*, *Colletotrichum*, *Fusarium*, *Epicoccum*, *Penicillium*, *Mucor*, *Rhizopus* and yeast species. The fungal population ranged from $7.5 \times 10^4 - 1.2 \times 10^7$ cfu/g in the samples. *Aspergillus flavus* was the most prevalent mycotoxigenic fungi. Plantain had the highest mean aflatoxin concentrations (42 µg/kg) followed by cassava (18.2 µg/kg) and yam (4.6 µg/kg). The EU regulatory limit for total aflatoxins (4 µg/kg) was exceeded in 31 %, 10 %, and 26 % of cassava, yam, and plantain samples respectively. Emamectine benzoate (EMB) residue concentration (regulatory limit of 0.002 ppm) was exceeded in 62 %, 68 %, and 72 % of cassava, yam, and plantain products, respectively. The highest average concentration of EMB was 0.054 ppm in cassava samples. The estimated liver cancer risk from dietary exposure to aflatoxinB1 in the crops was 0 to 5.42 cancer cases/year/100,000 persons. The high presence of multiple food hazards suggests sub-optimal postharvest practices related to poor hygiene, drying, and pest management. Strategies such as Integrated Pest Management and good agricultural practices are needed amongst value chain actors.

Keywords: food safety, mycotoxins, pesticide residues, post-harvest, risk assessment.

Chemical and functional properties of composite flour from High quality cassava flour(*Manihot esculenta crantz*), Sprouted sorghum(*Sorghum bicolor*) and Fermented African yam bean(*Sphenostylis stenocarpa*)

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Abstract

Cassava, sorghum, and African yam bean (AYB) are vital crops in tropical regions that contribute to food security through their affordability and nutritional value. This study aimed to develop and evaluate composite flours from high-quality cassava flour (HQCF), sprouted sorghum, and fermented AYB to produce a nutritious, gluten-free flour with improved functional and nutritional properties suitable for sub-Saharan Africa. HQCF was produced from TMEB419 cassava roots sourced from the Cassava Breeding Unit of IITA through peeling, washing, grating, pressing, drying at 60°C, and milling. Sorghum grains obtained from Bodija market were soaked, germinated for 3–4 days, dried at 60°C for 7 hours, dehulled, and milled. AYB of TSS68 from IITA's Genetic Resources Centre was soaked, fermented for 48 hours, dehulled, dried, and milled. Five blends (HQSA: 30:30:40; HQSA: 30:22.5:47.5; QHAS: 30:20:50; QHSA: 30:27.5:42.5; SAHQ: 30:25:45) were formulated using a simplex lattice design with 30% HQCF and varying AYB-sorghum ratios, compared with 100% wheat flour. Proximate composition, functional, and anti-nutritional properties were determined by AOAC methods ($p<0.05$). The QHSA blend (30% HQCF, 27.5% AYB, 42.5% sorghum) recorded 18.59% protein, 80.75% carbohydrates, 7.73% moisture, 162.72% water absorption, and 102.78% oil absorption. Sprouting and fermentation significantly reduced phytate (2.12%) and trypsin inhibitor (1.28 TIU/g) levels, improving nutrient bio-availability. The composite flour exhibited enhanced digestibility, balanced nutrition, and suitability for diverse food applications, offering a sustainable, protein-enriched, gluten-free alternative to support food security in sub-Saharan Africa.

Keywords: Composite flour, HQCF, Sorghum, African yam bean, food security.

Coping Mechanisms with *Tuta absoluta*: Determinants and Effect on Food Security Status of Tomato Farmers in Kano State

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Abstract

Tuta absoluta, tomato leafminer, is a worm considered to be among the most important and devastating pests of tomato in Nigeria. This potentially undermines household and national food security, increases food prices, endangers the environment and exposes consumers of fresh and processed tomato to the long-term health effect of pesticide residue. Determinants of coping mechanisms with *Tuta absoluta* and the effect of *Tuta absoluta* on household food security among tomato farmers were assessed through a household survey, covering 668 respondents in Bichi LGA of Kano State. To achieve this, ordered probit model was fitted to examine the effect of *Tuta absoluta* on food security in the study area. Multivariate probit model was employed to analyze the determinants of coping mechanisms with *Tuta absoluta* in the study area. Chemical control was found to be the most widely adopted (86.98%) coping mechanism while biological control (4.94%) was the least adopted coping mechanism. Most households (61.38%) were found to be food insecure. Food insecurity increased with rising *Tuta absoluta* infestation damage. While several factors influenced farmers' choices of control strategies, farmers whose farms were infested with *Tuta absoluta* were more likely to adopt chemical and cultural control methods and less likely to use improved varieties. A significant substitutability existed between biological control and chemical control practices, between cultural control and use of improved varieties, and between cultural control and biological control.

Keywords: *Tuta absoluta,* coping mechanism, food security, integrated pest management

Effects of Variety and Fertilizer Type on Physico-Chemical Composition of Sweet Corn (*Zea Mays L. Saccharata Sturt*) Kernel

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Abstract

The sugar content of sweet corn kernel is influenced by variety and harvest time. This research investigated the effects of variety and fertilizer type on the physico-chemical composition of sweet corn kernel. The field experiment was conducted between April and June, 2024 at Agricwas Farm, Aboke village, Lagelu Local Government Area, Oyo State, Nigeria, while the post field experiment was conducted at the Department of Horticulture Laboratory, Federal University of Agriculture, Abeokuta, Nigeria. There were two factors: variety (Sugar King F1 and Royal Hybrid) and fertilizer type of Poultry manure (40 t/ha), NPK 15:15:15 (100 kg N/ha), complimentary poultry manure and NPK fertilizer (½ NPK 15:15:15 + ½ poultry manure) and No fertilizer. The experiment was arranged in Randomized Complete Block Design fitted into split plot arrangement, with three replicates. Sweet corn harvested at the milk stage (65 days after planting) were placed in a plastic crate and taken to the laboratory for physico-chemical analysis. Sugar King F1 and Royal Hybrid varieties of sweet corn kernel had similar moisture, dry matter, fat, ash, crude fiber, crude protein and carbohydrate contents. However, Sugar King F1 had higher total soluble solids, total Sugar and starch contents when compared with the Royal Hybrid variety of sweet corn. Sweet corn kernel fertilized with ½ NPK 15:15:15 + ½ Poultry manure had the highest dry matter, crude protein, and carbohydrate contents when compared with sweet corn kernel fertilized with sole poultry manure, sole NPK 15:15:15 and no fertilizer treatments. Sweet corn kernels treated with sole poultry manure had higher total soluble solids and total sugar while the unfertilized sweet corn had the highest starch content. Variety and fertilizer type had no influence on the Light, Hue and Chroma color values of the sweet corn kernel. Sugar King F1 kernels were sweeter than Royal Hybrid kernel; both varieties had similar color at harvest; Sugar King F1 variety of sweet corn fertilized with 40 t/ha poultry manure were the sweetest.

Keywords: Zea mays var, fertilizer treatment, sweet corn kernel quality, sweetness

Consumer Awareness of Veterinary Drug Residues in Livestock Products

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Abstract

Antimicrobial resistance (AMR) is a major global health challenge, causing an estimated five million annual deaths worldwide. Beyond clinical impacts, AMR threatens food safety, as residues of veterinary drugs in livestock products can expose consumers to resistant bacteria. In rapidly urbanizing countries such as Nigeria, increasing demand for animal protein, coupled with weak regulation of food systems, heightens this risk. Assessing consumer awareness of these risks is critical for effective public health interventions. This study measured consumer knowledge of antimicrobial use (AMU) and residues in food-animal products in Akure, Ondo State, using survey data from 106 consumers. A Consumer Knowledge Index (CKI), ranging from 0 (low awareness) to 1 (high awareness), was constructed based on correct responses to questions on AMU, AMR, and residues. The Consumer Knowledge Index (CKI) ranges from 0.13 to 1, with a mean score of 0.71. About 15% of consumers demonstrate complete knowledge (CKI = 1), while 60% have moderate knowledge (scores between 0.50 and 1). However, 17% scored exactly 0.50 and 8% fell below 0.50, signaling significant awareness gaps. These results suggest that while general awareness of antimicrobial resistance is relatively strong, critical knowledge of how antibiotic use in livestock translates into residues and public health risks remains uneven. These findings highlight the need for consumer-focused education campaigns on antibiotic residues and their health risks. In addition, strengthening surveillance and residue testing, alongside stricter enforcement of veterinary drug regulations, should form part of Nigeria's National Action Plan on AMR to protect consumers and curb resistance.

Keywords: Antimicrobial Resistance, Antimicrobial Use, Residues, Consumer awareness.

Antibiotic Use in Poultry Production in Akure, Ondo State

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Abstract

Antimicrobial use (AMU) in food-animal production poses a global health concern due to the rapid emergence of antimicrobial resistance (AMR). Misuse of antibiotics in livestock not only threatens animal health but also creates risks at the human–animal interface, a central focus of the One Health framework. In Nigeria, AMU is projected to rise by 163%, underscoring the urgency of addressing potential AMR in the poultry sector, which remains one of the fastest-growing livestock industries and a major source of affordable protein for households. This study investigated antimicrobial-use practices among poultry producers in Akure, Ondo State, through a multistage random sampling of 90 farmers. The survey examined knowledge of veterinary drug use, diagnostic practices, treatment regimens, and antibiotic sources. The World Health Organization (WHO) and World Animal Health Organization (WOAH) classifications were applied to assess the medical importance of antibiotics reported. Findings revealed widespread antibiotic use: 90% of farmers used antibiotics for treatment, 84% for prevention, 63% for growth promotion, and 4% reported antiseptic use for hygiene management. Most farmers (76%) relied on veterinarians for prescriptions, purchasing mainly from veterinary stores (87%). Treatment patterns showed 77% used multiple antibiotics simultaneously, while 79% of reported antibiotics overlapped with those critical for human medicine. These results highlight significant antimicrobial use in poultry production, often without laboratory diagnosis, reflecting limited adherence to appropriate treatment regimens. The findings underscore the need to strengthen veterinary oversight, promote good husbandry practices, and establish a national antimicrobial surveillance system to improve farmers' knowledge, ensure responsible drug use, and mitigate AMR risks to both animal and human health in Nigeria.

Keywords: Antibiotic usage, Antibiotic resistance, One health, Livestock production.

Effect of Soaking on the Vitamins and Functional Properties of Pawpaw (*Carica Papaya*) Seeds

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Abstract

Pawpaw (*Carica papaya*) seeds are highly underutilized in Nigeria and often discarded as waste despite the abundance of its nutritive values. This study assessed the effects of soaking on the vitamin composition and functional properties of pawpaw seeds. Fresh seeds were extracted, de-coated, and dried. They were then soaked for 3, 6, and 9 hours, dried at 40°C, and ground into flour. Proximate analysis, vitamin content, and functional properties were evaluated using standard methods, and the data were subjected to statistical analysis. ANOVA revealed significant differences ($p < 0.05$) in moisture, ash, fat, fiber, protein, and carbohydrate contents, which ranged from (7.89-8.01)%, (5.32-5.75)%, (25.23-25.64)%, (12.35-12.92)%, (24.30-25.24)%, and (23.48-24.15)%, respectively. Soaking increased crude protein (23.48%) and carbohydrate (20.20%) compared to the control, while other components decreased. Vitamin E was most abundant, and Vitamin B2 was least. After 9 hours of soaking, vitamins A, B1, B2, and B3 increased by 88.24%, 0.15%, 0.07%, and 0.18%, respectively, while vitamins E (118.32%) and C (15.91%) decreased. Soaking also increased water absorption and swelling capacities, peaking at 298.53% and 50.07%, respectively. Oil absorption capacity and bulk density ranged from (176.39-184.21)% and (0.35–0.37) g/ml, with a significant reduction at 3 hours and a gradual increase at 9 hours. These results suggest that soaking pawpaw seeds enhances their vitamin content and functional properties, making them valuable for food applications and product development.

Keywords: Pawpaw, underutilized seeds, nutritional, vitamins, functional

Optimisation of Conditions for Lipase Production Using Fungal Isolates Obtained from Oily Substances

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Abstract

Lipases (triacylglycerol acylhydrolase EC 3.1.1.3) are enzymes that catalyse the hydrolysis of triglycerides into glycerol and free fatty acids, and they are mostly used in the food industry for flavour development, fat modification, and texture improvement. The increasing demand for lipase in food processing requires cost-effective and sustainable production methods. This then gives rise to the search for high-yield lipase producers and the optimisation of cultural conditions for enhanced lipase yield. In this study, fungal isolates were obtained from various oily substances (waste cooking oil, oil-contaminated soil) and screened for lipase production. The most efficient isolates, primarily *Penicillium* spp., and *Candida* spp., were subjected to optimisation studies to determine the optimum parameters for maximum lipase activity. Key factors such as incubation period, temperature, pH, carbon and nitrogen sources, and inducers were systematically varied using the one-factor-at-a-time (OFAT) approach. Results revealed that optimal lipase production occurred at pH 8.0, temperature of 30 °C, and incubation time of 5 days, with xylose, tryptone and castor oil serving as the most effective carbon source, nitrogen source and inducer respectively. The optimised conditions led to a significant increase in lipase yield compared to unoptimised conditions. In future studies, statistical optimization using Response Surface Methodology (RSM) will be explored to achieve a more precise prediction and improved process efficiency. These findings highlight the potential of fungal isolates from oily environments as promising and sustainable sources of food-grade lipases, offering promising industrial applications in food processing, which include cheese ripening for flavour development, and modifying fats to produce structured lipids for margarine.

Keywords: Lipase, fungal isolates, optimization, oily substances, food industry, enzyme production

Inhibitory Efficacy of Turmeric Powder and Palm Oil on Fungal Flora from Processed Cassava Flakes

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Abstract

Cassava (Manihot esculenta cranz) is basically grown for its roots which contains a high concentration of starch when compared with other food crops. It is a major staple food for most Africans. In this study, inhibitory efficacy of turmeric powder and palm oil inclusion at different production and storage stages on the total fungi flora (TFF) of different garri samples labelled A, B, C and D was studied over a period of time and the fungi present in each sample were isolated. This study was carried out because the presence of fungi in processed and sold garri is still a public health issue. The cassava tubers were peeled, washed and grated to obtain uniform sample A (white garri+turmeric powder after grating) Sample B (white garri+palm oil after grating. Sample C (white garri+tumeric after toasting) Sample D(white garri only as control) were bagged, dewatered and subjected to fermentation for three days (72 hours) and toasted into garri flakes. The different garri samples were evaluated to determine the fungal load of each sample. The results of the analysis showed the four garri samples (A, B, C and D) were subjected to fungal analysis and the results obtained were statistically analyzed. Samples were serially diluted to 109 and appropriate dilution is inoculated by pour plate method onto Potato Dextrose agar plates for fungal count. The values for sample A were in the range (1×10^3 to 1.5×10^3) sample B (1×10^3 to 3.0×10^3) , sample C (1×10^3 to 1.5×10^3), and sample D (3.5×10^3 to 6.0×10^3). The results of the analysis showed no significant difference at ($p < 0.05$) between the samples at 30 and 44 days after storage, the fungal load of palm oil treated samples(B) were high with aspergillus niger. And this could be due to the palm oil contamination. Whereas samples (A) treated with tumeric recorded lower fungal counts possibly due to the antimicrobial property of the curcumin which is the main active phytochemical in tumeric. The fungi isolated in all the samples include *Aspergillus niger*, *Fisarium*, *Rhizopus* and *Penicillium spp*. In conclusion, sample (A) turmeric powder had a significant effect on the fungal load reduction when compared with sample (D) the control (white garri only), this could be due to the anti-microbial nature of turmeric. As such turmeric powder will be a perfect replacement for the palm oil yellow garri that consumers yearn for.

ANNEX 1

ABOUT IARSAF

IARSAF is an acronym for the 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, food security, and natural resources and ecosystems 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

IAFSAF 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 solutions to problems affecting members.

MEMBERSHIP OF IARSAF

1. Membership eligibility shall be by appointment as a research scholar, research fellow, or visiting research student of the International Institute of Tropical Agriculture (IITA).
2. Membership shall be by registration, and only registered members of IARSAF shall benefit from the Association. Interested research scholars, research fellows, or visiting research students of the International Institute of Tropical Agriculture (IITA) should contact any of the IARSAF executives for registration.
3. Membership in IARSAF shall be voluntary.
4. Membership shall cease at the expiration of the contract.

   N.B: Ex-members are permitted to use the IARSAF general office in an orderly manner.

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)

28TH ANNUAL SYMPOSIUM (28th – 31st October 2025)

Theme: *"Science and Systems thinking: Driving Climate Resilience and Nutrition Transformation in African Food System."*

PROGRAMME OF EVENTS

DAY 1 – Tuesday, October 28, 2025

Opening Ceremony and Keynote Plenary

EVENT	FACILITATOR	TIME (WAT/EAT)	LOCATION
Login/Arrival of Guests/Registration	Protocol Officers	07:30 – 08:00 /09:30 – 10:00	Ibadan/Nairobi
Introduction of Guests/National Anthem	Moderator(s): **Olaoye Omotola Dorcas and IvyEva Nyambura**	08:00 – 08:10 /10:00 – 10:10	Ibadan/Nairobi
Welcome Address	**Dr. Simeon Ehui** DG, IITA	08:10 – 08:20 /10:10 – 10:20	Ibadan
Goodwill Messages	**Dr. Bernard Vanlauwe** (DDG, R4D IITA)	08:20 – 08:30 /10:20 – 10:30	Ibadan
	Dr. Tahirou Abdoulaye (DDG P4D, IITA)	08:30 – 08:40 /10:30 – 10:40	Ibadan
	Prof. Michael Abberton (Director, IITA West Africa Hub and Head, GRC)	08:40 – 08:50 /10:40 – 10:50	Ibadan
	Dr. David Chikoye (Director, IITA Southern Africa Hub)	08:50 – 09:00 /10:50 – 11:00	Zambia/Online

	Dr. Leena Tripathi (Director, IITA Eastern Africa Hub)	09:00 – 09:10 /11:00 – 11:10	Nairobi/Online
	Dr. Zoumana Bamba (Director, IITA Central Africa Hub)	09:10 – 09:20 /11:10 – 11:20	Kinshasa, Democratic Republic of Congo
	Ms. Zaina Sore (Head, CDO IITA)	09:20 – 09:30 /11:20 – 11:30	Ibadan
	Dr. Dorcas Ibitoye (Director of Research, NIHORT)	09:30 – 09:40 /11:30 – 11:40	Ibadan
Group Pictures	All Participants	09:40 – 09:50 /11:40 – 11:50	Ibadan/Nairobi/Online
Address from IARSAF President	**Victor Diekade**	09:50 – 10:00 /11:50 – 12:00	Ibadan
Keynote Address 1: "*Feeding Africa in a Changing Climate: Innovations at the Nexus of Science, Nutrition, and Policy***."**	**Prof. J.J Atungwu** (Provost, Federal College of Agriculture, Moor Plantation, Ibadan, Oyo State) Rapporteur: Nasirat Akanfe	10:00 – 10:20 /12:00 – 12:20	Ibadan
Questions & Answers	**All Participants**	10:20 – 10:30 /11:20 – 12:30	Ibadan/Nairobi
Keynote Address 2: "*Transforming African Agriculture through Nutrition-Sensitive Science and Leadership*"	**Prof. Bolanle Omolara Otegbayo** (Professor of Food Science and Technology and Provost, School of Postgraduate Studies, Bowen University, Iwo, Nigeria). Rapporteur: Ufuoma Akpojotor (PhD)	10:30 – 10:50 /12:30 – 12:50	Ibadan
Questions & Answers	**All Participants**	10:50 – 11:00 /12:50 – 13:00	Ibadan/Nairobi
Tea Break/Networking	All Participants	11:00 – 11:15 /13:00 – 13:15	Ibadan/Nairobi

Keynote Address 3: "*Financing and Governing Climate-Nutrition Solutions: Building System Resilience from the Ground Up***.**"	**Prof. O.M. Bamiro** (Dean, School of Postgraduate Studies, Landmark University, Nigeria) Rapporteur: Oche Akpa	11:20 – 11:40 /13:20 – 13:40	Ibadan
Questions & Answers	**All Participants**	11:40 – 11:50 /13:40 – 13:50	Ibadan/Nairobi
IARSAF Impact Story: *Science with a Human Face* – A Short Success Story	**Ayoola, Ayooluwa Samuel** (Editor-in-Chief, IARSAF)	11:50 – 12:00 /13:50 – 14:00	Ibadan
Keynote Address 4: "*Empowering Youth for Climate Resilience: Education, Equity, and Innovation in African Food Systems*"	**Ms. Temilade Salami** (Executive Director, Ecochampions) Rapporteur: Monsurat Abiola	12:00 – 12:20 /14:00 – 14:20	Online
Questions & Answers	**All Participants**	12:20 – 12:30 /14:20 – 14:30	Ibadan/Nairobi
Keynote Address 5: "*Systems Thinking for Climate-Resilient and Nutrition-Sensitive Food Systems in Africa*"	**Dr. Bonoukpoè Mawuko Sokame**, Postdoctoral Research Scientist International Centre of Insect Physiology and Ecology (icipe), Nairobi, Kenya Rapporteur: Mary Edhemuino	12:30 – 12:50 /14:30 – 14:50	Online
Questions & Answers	**All Participants**	12:50 – 13:00 /14:50 – 15:00	Ibadan/Nairobi
Presentation by Inqaba Biotec	Inqaba Biotec	13:00 – 13:30 /15:00 – 15:30	Ibadan
Closing Remarks and Announcements	LOC Chair/IARSAF Vice President	13:30 – 13:35 /15:30 – 15:35	Nairobi
Lunch Break	All Participants	13:35/15:35	Ibadan/Nairobi

DAY 2: OCTOBER 29, 2025

Plenary and Technical Sessions

EVENT	FACILITATOR	TIME (WAT/EAT)	LOCATION
Arrival / Login	Protocol Officers	07:30 – 08:00 / 09:30 – 10:00	Ibadan/Nairobi
Welcome and Intro	Moderators: Dr. Ufuoma Akpojotor and Michael Obondo	08:00 – 08:05 / 10:00 – 10:05	Ibadan/Nairobi
Opening Remarks & Overview	LOC Chair	08:05 – 08:10 / 10:05 – 10:10	Nairobi
Plenary Session 1 (Lead Paper and Technical Session 1)			
Lead Paper 1: *"Harnessing Climate-Smart Agriculture for Food Systems Resilience in Africa"*	**Dr. Ekanem Ukoabasi** (Data Manager, IITA Ibadan, Nigeria)	08:10 – 08:30 / 10:10 – 10:30	Ibadan
Questions & Answers	**All Participants**	08:30 – 08:40 / 10:30 – 10:40	Ibadan/Nairobi
1st Technical Session: *Climate-Resilient Agricultural Systems (CAS)* (Oral + Poster Presentations)	Chair: Dr. Ekanem Ukoabasi Rapporteurs: Faith Ohaju and Terence Okpogba	08:40 – 09:40 / 10:40 – 11:40	Ibadan/Nairobi
Tea Break	All Participants	09:40 – 09:55 /11:40 – 11:55	Ibadan/Nairobi
Plenary Session 2 (Lead Paper and Technical Session 2)			
Lead Paper 2: *"Healthy Soils, Healthy Crops: Diagnostics, IPM & Climate-Resilient Production"*	**Dr. Danny Coyne** (Senior Scientist, IITA Kenya)	09:55 – 10:15 / 11:55 – 12:15	Nairobi
Questions & Answers	**All Participants**	10:15 – 10:25 / 12:15 – 12:25	Ibadan/Nairobi
2nd Technical Session: *Soil Health and Plant Protection (SHPP)* (Oral + Poster Presentations)	Chair: Dr. Danny Coyne Rapporteurs: Letrixe Kerubo and Ewa Uchechi Victoria	10:25 – 11:25 / 12:25 – 13:25	Nairobi/Ibadan
Lunch	All Participants	11:25 – 12:25 / 13:25 – 14:25	Ibadan/Nairobi
Plenary Session 3 (Lead Paper and Technical Session 3)			
Lead Paper 3: "*Mainstreaming Gender and Youth for Inclusive Food Systems*."	**Dr. Olajumoke Adeyeye** (Gender Specialist, IITA Ibadan)	12:25 – 12:45 / 14:25 – 14:45	Ibadan

	Rapporteurs: Favour Ayorinde and Gbenga Kolawole		
Questions & Answers	**All Participants**	12:45 – 12:55 / 14:45 – 10:55	Ibadan/Nairobi
Panel Discussion 1: "*Equity and Inclusion in African Food Systems: Transforming Participation into Power*"	**Panellists:** 1. Dr. Ufuoma Akpojotor 2. Ms. Mary Diekade 3. Mr. Noel Mulingaya 4. Mr. Muhammed Jimoh **Moderator: Omotola Dorcas Olaoye**	12:55 – 13:25 / 14:55 – 15:25	Ibadan/Nairobi
Plenary Session 4 (Lead Paper and Technical Session 4)			
Lead Paper 4: "*From Lab to Field: Digital, AI & Tech Innovations Driving Sustainable Intensification*"	**Dr. Henri Tonnang** (Head – Data & Research Methods Unit (DRMU) IITA, Nairobi, Kenya	13:25 – 13:45 / 15:25 – 15:45	Nairobi
Panel Discussion 2: "*The Digital Farmer: Who Gains, Who's Left Behind in Africa's AgTech Revolution*?"	**Panellists:** 1. Dr. Olakunle Sansa 2. Dr. Nike Dada 3. Ms. Mary Modupe Omotoso **Moderator: Monsurat Abiola**	13:45 – 14:15 / 15:45 – 16:15	Ibadan/Nairobi
4th Technical Session: *Systems Thinking, Digitalization and Innovation in African Food Systems* (SDIAFS) (Oral + Poster Presentations)	Chair: Dr. Henri Tonnang Rapporteurs: Yvonne Shitandi and Chioma Ilodibia	14:15 – 15:15 / 16:15 – 17:15	Nairobi/Ibadan
Wrap Up and Announcements	Moderator	15:15 – 15:20 / 17:15 – 17:20	Ibadan

DAY 3: OCTOBER 30, 2025

Plenary, Technical Sessions & 3-Minute Pitch (3MP)

EVENT	FACILITATOR	TIME (WAT / EAT)	LOCATION
Arrival / Opening	Protocol Officers	07:30 – 08:00 / 09:30 – 10:00	Ibadan/Nairobi
Welcome and Intro	Moderators: Nasirat Akanfe and Juddith Nzau	08:00 – 08:05 / 10:00 – 10:05	Ibadan/Nairobi
Plenary Session 5 (Lead Paper and Technical Session 5)			
Lead Paper 5: "Advancing Crop Improvement Through Biotechnology: Innovations for Climate Resilience and Food Security in Africa".	**Dr. Melaku Gedil** (Principal Scientist, Molecular breeder, IITA)	08:05 – 08:25 / 10:05 – 10:25	Ibadan
Questions & Answers	**All Participants**	08:25 – 08:35 / 08:25 – 10:35	Ibadan/Nairobi
5th Technical Session: "*Crop Improvement and Biotechnology*" (Oral + Poster Presentations)	Chair: Dr. Melaku Gedil Rapporteurs: Haleemah Sharafadeen and Margaret Macharia	08:35 – 09:35 / 10:35 – 11:35	Ibadan/Nairobi
Tea Break	All Participants	09:35 – 09:50 / 11:35 – 11:50	Ibadan/Nairobi
Plenary Session 6 (Lead Paper and Technical Session 6)			
Lead Paper 6: "Strengthening Value Chains and Agribusiness for Climate-Resilient Food Systems".	**Dr. Mercy Diebiru-Ojo** (Seed Systems Specialist, IITA Ibadan, Nigeria)	09:50 – 10:10 / 11:50 – 12:10	Ibadan
Questions & Answers	**All Participants**	10:10 – 10:20 / 12:10 – 12:20	Ibadan/Nairobi
6th Technical Session: *Climate-smart value chains and agribusiness opportunities* (CVCA) (Oral + Poster Presentations)	**Chair:** Dr. Mercy Diebiru-Ojo Rapporteurs: Oluwatobiloba Oluwole and Catherine Irungu	10:20 – 11:20 / 12:20 – 13:20	Ibadan/Nairobi
Plenary Session 7 (Lead Paper and Technical Session 7)			
Lead Paper 7: "Food Processing and Safety Innovations for Nutrition Transformation".	**Dr. Mercy Lung'aho** (Lead - Food Security, Nutrition, & Health Program, IITA)	11:20 – 11:40 / 13:20 – 13:40	Ibadan

Questions & Answers	**All Participants**	11:40 – 11:50 / 13:40 – 13:50	Ibadan/Nairobi
7th Technical Session: *Food Processing, Nutrition, and Food Safety* (FPNFS) (Oral + Poster Presentations)	**Chair:** Dr. Mercy Lung'aho Rapporteurs: Ogechi Ihuoma and Lilian Kerubo	11:50 – 12:50 / 13:50 – 14:50	Ibadan/Nairobi
Lunch	All Participants	12:50 – 13:50 / 14:50 – 15:50	Ibadan/Nairobi
3MP (3-Minute Pitch Competition): Communicating Science for Impact	3MP Presenters	13:50 – 14:50 / 15:50 – 16:50	Ibadan/Nairobi
Award Presentations: 3MP Winners.	Chief Judge	14:50 – 15:05 / 16:50 – 17:05	
Closing Remarks & Vote of Thanks	Emily Anyango Chair LOC/IARSAF Vice President	15:05 – 15:15 / 17:05 – 17:15	Nairobi
Wrap Up and Announcements	Moderators	15:15 – 15:20 / 17:15 – 17:20	Ibadan/Nairobi
Group Pictures	All Participants	15:20 – 15:30 / 17:20 – 17:30	Ibadan/Nairobi

DAY 4: OCTOBER 31, 2025 (IITA Tour, Dinner, and Award Night) - IITA Ibadan

EVENT	**FACILITATOR**	**TIME (WAT)**
Arrival of Guests	All Participants	09:00
IITA HQ Tour	All Participants	09:00 – 13:00
Arrival and Registration	Protocol Officers	16:30 – 17:00
Introduction of Guests and Dignitaries	Mr. Gbenga Oluwayomi Moderator	17:00
President's Welcome Remarks	Victor Diekade (IARSAF President)	17:00 - 17:10
Icebreaker Game	Mr. Gbenga Oluwayomi Moderator	17:10 -17:20
Award Presentations	Gbaruko Gift (IARSAF General Secretary)	17:20 - 17:35
Fun Game/Trivia	Mr. Gbenga Oluwayomi Moderator	17:35 - 17:45
Special Performance or Entertainment	Mr. Gbenga Oluwayomi Moderator	17:45 - 17:55

Final Award Presentation	Victor Diekade (IARSAF President)	17:55 - 18:10
Closing Game or Activity	Mr. Gbenga Oluwayomi Moderator	17:10 - 18:20
Vote of Thanks & Closing	Elufisan Susan (IARSAF Treasurer)	18:20 – 18:25
Dinner Served	Welfare/Protocol	18:25 - 19:00
Dance! Dance!! Dance!!!	All participants	19:00 ……

ANNEX 3

INTERNATIONAL ASSOCIATION OF RESEARCH SCHOLARS AND FELLOWS (IARSAF)
EXECUTIVE OFFICERS (2025 - 2026)

Full name: Diekade Victor Adelodun
Position: President
Hub: West Africa hub
Academic level: PhD
Name of University: University of Ibadan, Ibadan, Nigeria
IITA Supervisor: Dr. A. Menkir
University Supervisor: Dr. A. Abe

Full name: Emily Anyango Ong'ondo
Position: Vice President
Hub: East Africa hub
Academic level: MSc.
Name of University: Jomo Kenyatta University of Agriculture and Technology
IITA Supervisor: Dr. Harun Murithi
University Supervisor: Dr Sam Were

Full name: Gift Chinonye Gbaruko
Position: General Secretary
Hub: West Africa hub
Academic level: M.Sc.
Name of University: University of Ibadan, Ibadan, Nigeria
IITA Supervisor: Prof. Michael Abberton
University Supervisor: Prof. V.O. Adetimirin

Full name: Ayoola, Ayooluwa Samuel
Position: Editor-in-Chief
Hub: West Africa hub
Academic level: PhD
Name of University: Ladoke Akintola University of Technology (LAUTECH)
IITA Supervisor: Dr. Mercy Lung'aho
University Supervisor: Engr. Prof. S. O. Jekayinfa

Full name: Damus Mwangi Wanjiku
Position: Assistant General Secretary
Hub: East Africa hub
Academic level: MSc.
Name of University: Jomo Kenyatta University of Agriculture and Technology
IITA Supervisor: Prof. Danny Coyne
University Supervisor: Dr. Lucy K. Murungi

Full name: Elufisan Tobi Susan
Position: Treasurer
Hub: West Africa hub
Academic level: PhD
Name of University: Federal University of Agriculture, Abeokuta, Nigeria
IITA Supervisor: Prof. Michael Abberton
University Supervisor: Prof. J.J Atungwu

Full name: Ogunkanmi Mubarak Akorede
Position: Welfare Officer
Hub: West Africa hub
Academic level: PhD
Name of University: University of Ibadan, Ibadan, Nigeria
IITA Supervisor: Prof. Michael Abberton
University Supervisor: Dr. O.J. Olawuyi

Full name: Olaleye Victor John
Position: Public Relations Officer 1 (PRO 1)
Hub: West Africa hub
Academic level: PhD
Name of University: University of Ibadan, Ibadan, Nigeria
IITA Supervisor: Prof. Michael Abberton and Dr Oyatomi
University Supervisor: Dr T.B. Akinrinola

Full name: Letrixe Kerubo Mokaya
Position: Public Relations Officer 2 (PRO 2)
Hub: East Africa hub
Academic level: MSc.
Name of University: Jomo Kenyatta University
of Agriculture and Technology
IITA Supervisor: Prof. Danny Coyne
University Supervisor: Dr Sam Were

ANNEX 4

Organizers

International Association of Research Scholars and Fellows (IARSAF)

International Institute of Tropical Agriculture (IITA)

Members of the organizing committee

S/N	Name	Unit in IITA	Committee	University
1	Ong'ondo, Emily Anyango	Nematology Unit	LOC Chairperson	Jomo Kenyatta University of Agriculture and Technology, Kenya
2	Ayoola, Ayooluwa Samuel	Food Nutrition and Sciences Laboratory	Editorial	Ladoke Akintola University of Technology, Nigeria
3	Diekade, Victor Adelodun	Maize Improvement Program	Fundraising	University of Ibadan, Nigeria
4	Gbaruko, Gift Chinonye	Genetic Resources Center	Fundraising	University of Ibadan, Nigeria
5	Elufisan, Tobi Susan	Genetic Resources Center	Fundraising	University of Ibadan, Nigeria
6	Ogunkanmi, Mubarak Akorede	Genetic Resources Center	Welfare	University of Ibadan, Nigeria
7	Letrixe, Kerubo Mokaya	Nematology Unit	Publicity and Media	Jomo Kenyatta University of Agriculture and Technology, Kenya
8	Oke Funmilayo	Genetic Resources Center	Protocol	University of Ibadan, Nigeria
9	Nwogwugwu, Precious Amarachi	Genetic Resources Center	Fundraising	Federal University of Agriculture, Abeokuta
10	Olukunle, Babatunde Bashir	Cassava Breeding	Fundraising	Federal University of Agriculture, Abeokuta
11	Olaleye, Victor John	Genetic Resources Center	Publicity and Media	University of Ibadan, Nigeria
12	Damus, Mwangi Wanjiku	Nematology Unit	Welfare	Jomo Kenyatta University of Agriculture and Technology, Kenya

ANNEX 5: TRAVEL GRANT AWARD RECIPIENTS

28th IARSAF Annual Symposium Travel Grant Awardees

As part of efforts to promote inclusivity and support outstanding early-career researchers, travel grants were awarded to selected participants of the 28th IARSAF Annual Symposium.

The selection was based on the quality and ranking of submitted abstracts, with preference given to top-performing submissions across the symposium themes.

The following individuals were selected as Travel Grant Award Recipients:

S/N	Name	Abstract Code	Abstract Title
1	Olutoyosi I. G	Abstract 010	Development of Nutritious and Safe Sorghum-Based Products: Evaluating the Impact of Vegetable Fortification
2	Moyosore Shittu	Abstract 038	In silico Identification and Characterization of Stress-Responsive Genes in Rice Bean (*Vigna umbellata*) for Climate-Resilient Agriculture
3	Comfort Adedokun	Abstract 052	Assessment of the Environmental Impact of Amaranth on Urban Ecology and Landscape Management
4	Ojo Olayemi Faith	Abstract 032	The Knowledge–Practice Divide: A Systemic Barrier to Soil Health and Climate Resilience in Nigeria
5	Busayo Tofio	Abstract 003	Biotechnological Approaches for Improving Crop Resilience to Climate Change: A Review of Gene Editing and Genomic Selection Strategies
6	Akande Olufemi	Abstract 053	Multivariate Classification of Pawpaw

			(*Carica papaya* L.) Varieties Using Agronomic and Nutritional Traits Profile
7	Omowumi Oluwakemi	Abstract 065	Optimisation of Conditions for Lipase Production Using Fungal Isolates Obtained from Oily Substances"
8	Ruth Lawal	Abstract 026	Comparative Leaf Epidermal Studies of Three Species in the family *Moraceae* (*Ficus natalensis*, *Ficus lutea* and *Ficus thonningii*)
9	Tsado M. U.	Abstract 045	"Influence of Horticultural Waste Compost and Nano-Fertiliser on Performance of Okra
10	Saliu Iswat Adenike	Abstract 039	Cytoplasmic Inheritance of *Zea mays* L. (Maize) in Crop Improvement
11	Ogunwolu Qudus	Abstract 069	Economic Analysis of Cashew Farming Systems in Nigeria: Towards Climate-Resilient Livelihoods
12	Adegbemiro A. J.	Abstract 051	Consumer Awareness of Veterinary Drug Residues in Livestock Products

The IARSAF leadership congratulates all awardees and commends their excellent research contributions toward advancing science and innovation in African food systems.

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 of 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.

Staff of GRC IITA

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.

Staff of Inqaba Biotec