



3rd All Africa Postharvest Congress and Exhibition

13th-16th September 2021

HOSTED BY THE AFRICAN UNION COMMISSION, VIRTUAL

Programme

THE TIME INDICATED IS ADDIS ABABA TIME (GMT+3) = EAST AFRICAN TIME (EAT)



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WELCOME NOTE FROM THE HOST – AFRICAN UNION COMMISSION



It is my honour to welcome you to the 3rd All Africa Postharvest Congress and Exhibition. As the African Union Commission (AUC) we are proud to host this continental event on a virtual platform as we adjust to the new normal occasioned by the COVID-19 Pandemic.

We are proud to note that the All-Africa Postharvest Congress and Exhibition (AAPHCE) has now been institutionalised as an African Union Platform on experience sharing and reporting on our collective efforts to reduce food loss and waste on the continent.

The compounding impacts of climatic shocks, conflict and insecurity, adverse macro-economic shocks, desert locust invasion and the COVID-19 pandemic, together with protracted food insecurity from past shocks will likely lead to a food security crisis of an unprecedented magnitude. Specifically, the COVID-19 pandemic has exposed the vulnerability and inefficiency of our food systems. Significant volumes of food have been lost/wasted as food distribution systems were disrupted, especially in low-income countries with inadequate postharvest infrastructure.

To contribute to the efforts to address the problem of food loss and waste, the AUC in partnership with various organizations/institutions is convening the 3rd All Africa Postharvest Congress and Exhibition. The Congress theme 'Postharvest Loss Reduction for Sustainable Food Systems' is aligned to the United Nation's 2021 call to action towards sustainable food systems whose climax summit is slated for September 23, 2021. The importance of food loss and waste reduction in efforts to end hunger in sustainable food systems cannot be gainsaid.

The Congress provides a platform for stakeholders to share experiences and identify actions to be undertaken to ensure continuation of agricultural activities and rapid support to the communities and governments to prevent further deterioration of the food security and nutrition situation. This includes putting in place measures that will reduce post-harvest food losses and thus have more food available for our communities. This is also consistent with the African Union's Malabo Declaration on Agriculture for shared prosperity and improved livelihoods which committed our governments as part our efforts to end hunger in Africa by 2025 to also reduce Post-harvest losses by 50% by 2025.

I would like to acknowledge our partners who have made this convening possible through their financial support. They include the United Nations Food and Agriculture Organization (FAO), the World Food Program (WFP), Sasakawa Africa Association (SAA), the Netherlands Government, the Buhler Group, Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss (USAID). I would wish to call upon more strategic partners to come on board as we seek to strengthen the Congress platform and steer the continent towards actualizing agenda 2063.

I would like to express my sincere appreciation to the multi-stakeholder congress organizing committee whose relentless efforts have made it possible for this congress to take place. I would also like to specifically applaud the University of Nairobi for their efforts in conceptualizing this congress in the first place and providing leadership for its institutionalization and continuity.

Finally, I would like to thank you all for finding time to attend the congress because without you, we would not have the event. I am happy to note that this congress has attracted participants from across the globe including researchers/academia, food supply chain practitioners, industry player, policy makers, UN Food system champions and other stakeholders in the food sector.

I wish you fruitful interactions (virtual) during the four days of the Congress.

I thank you for honouring us with your presence and extend a very warm welcome to you all.

Amb. Josefa Sacko,

Commissioner for Agriculture, Rural Development, Blue Economy and Sustainable Environment (DARBE)

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SIDE EVENT ORGANIZERS



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CONGRESS COMMITTEES

RESOURCE MOBILIZATION COMMITTEE

Mr. Komla Bissi - African Union Commission
Dr. Janet Edeme – African Union Commission
Dr. Mel Oluoch – Sasakawa Africa Association
Ms. Magdalena Owusu Moshi – World Food Program
Dr. Damian Ihedioha - African Development Bank
Prof. Jane Ambuko – University of Nairobi
Ms. Betty Kibaara – Rockefeller Foundation
Dr Lisa Kitinoja – Postharvest Education Foundation
Mr. Christiani Buani – World Food Program
Mr. Mphumuzi Sukati – Food and Agriculture Organization of the United Nations
Ms. Jeanet Smids-Goosen – Netherlands Ministry of Agriculture
Ms. Hu Yaoqing – China’s National Food and Strategic Reserves Administration (NAFRA)

TECHNICAL COMMITTEE MEMBERS

Prof. Jane Ambuko – University of Nairobi, Kenya (Technical Committee Chair)
Prof. Olaniyi Fawole – University of Johannesburg, South Africa (Technical Committee Co-chair)
Prof. Tanya Stathers – Natural Resources Institute (NRI), University of Greenwich, UK; African Postharvest Losses Information System (APHLIS) – (Thematic leader – Subtheme 1)
Dr. Kizito Nishimwe – University of Rwanda, Rwanda (Thematic leader – Subtheme 1)
Dr. Dieudonne Baributsa – Purdue Improved Crop Storage (PICS) Program; Purdue University, USA (Thematic leader – Subtheme 2)
Prof. Brighton Mvumi - University of Zimbabwe, Zimbabwe; African Postharvest Losses Information System (APHLIS) Network (Thematic leader – Subtheme 2)
Ing. Joseph O. Akowuah – Kwame Nkrumah University of Science & Technology, Ghana (Thematic leader – Subtheme 3)
Dr. Vijay Yadav Tokala – The Postharvest Education Foundation, USA (Thematic leader – Subtheme 3)
Ms. Karen Munoko – Forum for Agricultural Research in Africa, FARA, Ghana (Thematic leader – Subtheme 4)
Prof. Klein Ileleji – Purdue University, West Lafayette, Indiana, USA; JUA Technologies International LLC, USA (Thematic leader – Subtheme 4)
Dr. Dirk E. Maier – Consortium for Innovations in Post-Harvest Loss and Food Waste Reduction, Iowa State University, USA (Thematic leader – Subtheme 5)
Dr. Augustine Okoruwa – Global Alliance for Improved Nutrition, GAIN, Nigeria (Thematic leader – Subtheme 5)
Mr. Cephass Taruvinga - Postharvest Consultant, Zimbabwe (Thematic leader – Subtheme 6)
Mr. Joseph Mpagalile – Food and Agriculture Organization, Tanzania (Thematic leader – Subtheme 6)
Prof. Archileo Kaaya – Makerere University, Uganda
Prof. Umezuruike Linus Opara – Stellenbosch University, South Africa
Mr. Brett Rierson – Harvest Agricultural Solutions, Uganda
Prof. Margaret Hutchinson – University of Nairobi, Kenya
Prof. Willis Owino – Jomo Kenyatta University of Agriculture and Technology, Kenya

Dr. Gloria Essilfie – University of Ghana, Ghana
Dr. Lisa Kitinoja – The Postharvest Education Foundation, USA
Dr. Olubukola Odeyemi – Federal University of Agriculture, Abeokuta, Nigeria
Prof. Eyitayo Makinde - Federal University of Agriculture, Abeokuta., Nigeria
Dr. Rashid Suleiman – Sokoine University of Agriculture, Tanzania
Dr. Sun Hui – Academy of Grain Science, National Food and Strategic Reserves Administration, P.R. China
Mr. Kyle Poorman – Consortium for Innovations in Postharvest Loss and Food Waste Reduction, USA.
Dr. Douglas Ouma – Retouch Africa Consulting (RAI)
Mr. Emmanuel Amwoka – University of Nairobi, Kenya
Mr. Suleiman Mutuli – University of Nairobi, Kenya
Mr. Robert Ouko – University of Nairobi, Kenya

LOGISTICS AND COMMUNICATION COMMITTEE

Ms. Samrawit Takele- Event Organizer – Romhay Travel and Event Organizers
Mr. Tom Gao– Buhler Group
Ms. Brenda Kariuki – World Food Program
Mr. Komla Bissi - African Union Commission

THE SECRETARIAT

CHAIR - RESOURCE MOBILIZATION COMMITTEE



Mr. Komla Bissi
CAADP Coordinator at AUC/Senior Advisor
to AfCFTA Secretary General

CHAIR: TECHNICAL COMMITTEE



Prof. Jane Ambuko,
Postharvest Specialist,
University of Nairobi, Kenya

CO-CHAIR - TECHNICAL COMMITTEE



Prof. Olaniyi Fawole
Postharvest Specialist, University
of Johannesburg, South Africa

3RD AAPHCE MODERATOR



Dr. Douglas Ouma
Retouch Africa Consulting

CHAIR - COMMUNICATION AND LOGISTICS



Ms. Samrawit Takele
Romhay Travel and
Event Organizers

CO-OPTED GRADUATE STUDENTS



Mr. Emmanuel Amwoka
University of Nairobi, Kenya



Mr. Suleiman Mutuli
University of Nairobi, Kenya

DAY ONE

13TH SEPTEMBER 2021

SIDE EVENTS

SIDE EVENTS

9.00am - 11.30am	SIDE EVENT 1 - World Food Program (WFP)
11.30am - 12.00pm	Break
12.00pm - 2.30pm	SIDE EVENT 2 - Forum for Agricultural Research in Africa (FARA) SIDE EVENT 3 - BUHLER GROUP
2.30pm - 3.00pm	Break
3.00pm - 5.30pm	SIDE EVENT 4 - Strengthening African Processors (SAP) SIDE EVENT 5 - The African Postharvest Losses Information System (APHLIS)
5.30pm - 6.00pm	Break
6.00pm - 8.30pm	SIDE EVENT 6 - Consortium for Innovation in Post-Harvest Loss and Food Waste Reduction, IOWA State University.

*See the detailed side event programs in the addendum

*****EXHIBITIONS & POSTER VIEWING IN GALLERY WILL CONTINUE ALL THROUGH THE 4 DAYS**



DAY TWO
14TH SEPTEMBER 2021

8.45 - 10.30 AM PARALLEL SESSIONS (ORAL PRESENTATIONS)

Workstream 1A (Extent, Causes and Impacts of Food Loss and Waste of Perishable Crops and Tree Crops)

Session Moderator: Prof. Willis Owino

Session Rapporteur: Dr. Tanya Stathers

ORAL PRESENTATIONS (10minutes each)

Victor Dania - Identification and characterization of *Rhizopus* species causing postharvest rot disease of sweetpotato isolated in Nigeria

Charity Gathambiri - Fungi associated with bulb onion (*Allium cepa* L.) postharvest rots in major markets located in growing regions of Kenya

Assane Beye - Post-harvest losses of vegetables in Senegal: From on farm data to national scale impact

Regine Tchientche Kamga - Drivers of Postharvest Losses in Traditional African Vegetables and Barriers for Improving Incomes and Nutrition of Actors in Cameroon

Anelle Blanckenberg - Postharvest losses in quantity and quality of Table Grape (cv. Crimson Seedless) along the supply chain and associated economic, environmental and resource impacts

Martin Agyemang - Assessing drivers of postharvest losses in the raw cashew nut supply chain: a tangible and intangible resources perspective

Abrar Sualeh - Indigenous Knowledge, Postharvest Handling Practices, Losses and Determinants: The Case of Coffee in BenchMaji and Sheka Zones of Ethiopia

Discussion Session

Workstream 3A (Innovative Technologies for Postharvest Quality Preservation and FLW Reduction: Storage Technologies for Perishable Crop Commodities)

Session Moderator: Ing. Joseph O. Akowuah

Session Rapporteur: Mr. Hory Chikez

ORAL PRESENTATIONS (10minutes each)

Angeline Mujeyi - Innovative post-harvest management practices in small grains value chains in the drylands

Bababode Adesegun Kehinde - Effects of Hermetic Storage on the α -Amylase Content and Antioxidant Activity of SRW Wheat

Bola Amoke Awotide - Impact of Adoption of Hermetic Storage Systems on Rural Households' Welfare: Evidence from Mali

Demba Diakhate - Mechanizing the processing of pearl millet in Senegal: The role of research and technology adoption

Emmanuel Arthur - Assessment of PICS Bag for Maize Storage in Ghana

Francis Okori - Understanding awareness, knowledge, and constraints to adoption of grain hermetic storage in Northern Uganda

Ma. Cristine Concepcion D. Ignacio - Predicting Oxygen Depletion during Grain Storage using Hermetic Bag Technology

George Obeng-Akrofi - Evaluation of Hermetic Bag Technology for Storage Preservation of Shea Nuts in Rural Ghana

Ismael Mayanja - The Journey Towards Reducing Post-Harvest Losses Through Developing Intermediate Technologies for Small-Scale farmers in Uganda

Ma. Cristine Concepcion D. Ignacio - Analytic Hierarchy Process Applied to the Ranking of Commercially Available Hermetic Bag Liners

Discussion Session

Workstream 3B (Applicable Technologies for Postharvest Quality Preservation and FLW Reduction: Technologies for Shelf-life Extension in Perishable Crop Commodities)

Session Moderator: Prof. Olaniyi Fawole

Session Rapporteur: Dr. Olubukola Odeyemi

ORAL PRESENTATIONS (10minutes each)

Adugna Bikila - Effect of Pre-treatment and Drying Temperature on Physicochemical and Functional Properties of Anchote (*Coccinia Abyssinica* (Lam.) Cogn.) Tuber Flour

Charity Kambani-Banda - Enriching Maize-Legume Flours with Orange - Fleshed Sweet Potato (OFSP) can Help Reduce Vitamin A Deficiency and Postharvest Loss in Malawi

Charity Kambani-Banda - Soy kits: An economically viable value addition technology for soymilk processing in Malawi

Duke Omayio - Effect of different pulping methods on the physicochemical properties of the Kenyan red and white-fleshed guava pulp

Eliud Wafula - Controlled Fermentation of African nightshade (*Solanum scarbrum*)-a comparative study on nutrient composition and reduction of food-borne pathogens

Hayat Hassen Mohammed - Effect of Pretreatments and Solar Tunnel Dryer Temperature on Proximate and Bioactive Components of Pumpkin (*Cucurbit maxima*) Pulp Powder

Fatimat Adebayo - Comparative Assessment of Dried Moringa Leaves for Diet Supplementation in Sub-Sahara Africa: A Case Study of Nigeria

Vida Opoku Edusei - Evaluation of some Selected Mango Varieties for Fruit Powder Production in Ghana

Frank Sangija - Trends and constraints in the utilization of African nightshade (*Solanum nigrum* complex) in Tanzania: A case study of Kilimanjaro and Morogoro regions

Discussion Session

10.30 - 10.45 AM BREAK

10.45 - 12.15 PM PARALLEL SESSIONS (ORAL PRESENTATIONS)

Workstream 3C (Applicable Technologies for Postharvest Quality Preservation: Non-perishable Crop Commodities)

Session Moderator: Ing. Joseph O. Akowuah

Session Rapporteur: Dr. Gloria Essilfie

ORAL PRESENTATIONS (10minutes each)

Elijah Akindele - Use of Polyurethane Insulated chambers to reduce post-harvest losses for the Nigerian market

Ismaila Aderulo - Molecular Characterization of Larval Morphotypes of Beet Webworm Moth *Spoladea recurvalis* (Fabricius) (Lepidoptera: Pyralidae) as A Panacea to Postharvest Loss of Amaranths in Africa

Muganyizi Jonas Bisheko - Major Constraints to Adoption of Improved Postharvest Technologies among Smallholder Farmers in Sub-Saharan Africa and South Asia: A Systematic Literature Review

Mutiu Badmus - Reducing Orange Flesh Sweet Potato (OFSP) Losses and Waste: An Evaluation of Triple-S Technology in Northern Ghana

Getachew Minas - Economic Analysis for Threshing/Shelling Machine Service Provision to reduce postharvest loss in Ethiopia.

Boutaina Mounir - Freefreeze, a solar off-grid cold storage technology to save postharvest losses of smallholder farmers

Evodius Waziri Rutta - Deploying Solar-powered Cold Storage Technologies to reduce Post-harvest Losses: Barriers and Opportunities in Tanzania

Jane Ambuko - Hub and Spoke Innovation Model for Scaling Postharvest technologies: A Case Study of Small-scale Mango Processing Technologies in Kenya

William T. Lanier - Harvest-tenure Promotes Innovative Technologies, Tools, Practices and Training to Reduce Postharvest Loss

Francis O. Wayua - Climate-Smart Technologies for Postharvest Loss and Waste Reduction in Banana Value Chain in Kenya

Discussion Session

Workstream 3D (Applicable Technologies for Postharvest Quality Preservation and FLW Reduction: Perishable and non-perishable food crops)

Session Moderator: Dr. Vijay Yadav

Session Rapporteur: Dr. Rashid Suleiman

ORAL PRESENTATIONS (10minutes each)

Augustine Okoruwa - Potential Socio-Economic Impact of Replacing Traditional Woven Baskets with Reusable Plastic Crates on Livelihoods of Basket Makers in Southeast Nigeria

Charles Singano - Can warehouse receipt systems and community grain banks be potential climate adaptation strategies for postharvest loss reduction in Malawi?

Hory Chikez - Mango postharvest technologies: An observational study of the Yieldwise Initiative in Kenya

Steve Sonka - An Economic Framework for Post-Harvest Loss Reduction

Tanya Stathers - Interventions for reducing crop postharvest losses in sub-Saharan Africa: a systematic evidence synthesis and gap map

Egbert Ngosa Munganama - Capacity Building in Post-Harvest Loss Management of Food Commodities to Increase Local Capacity for Sustainable Climate-Hazard Preparedness.

Oluwatosin Komolafe - Impact of Tillage Practices on Growth and Yield of Crop- Can It Reduce or Increase Food Loss?

Trust Kasambala Donga - Storability of Low and Highly Infested Maize in Purdue Improved Crop Storage (PICS) Bags

Discussion Session

Workstream 3E (Assessing and addressing food loss and waste of fish and fruits)

Session Moderator: Prof. Willis Owino

Session Rapporteur: Mr. Duke Gekonge

ORAL PRESENTATIONS (10minutes each)

Omar Peñarubia - Food Loss and Waste in Fish Value Chain: Addressing the Information Gap through an Online Repository

Peter Michael Oduor-Odote - Improved fried fish display shelves for women in the fried fish chain along Coastal Kenya: "The Mama Karanga box

Joyce G. Maina - Evaluation of Post-harvest losses and potential for use of off-grid power systems in the Fisheries value chain in Kenya

Francis G. Attoesi - Reducing Post-harvest Losses in Dioscorea spp. to Plant-Parasitic Nematodes Using Abamectin Treated Banana Paper in Krachi Nchumuru District of Ghana

Gbadebo Olukuton - Investigation of Local Antagonistic Fungal Isolates as Potential Bio-Fungicides in the Post-Harvest Preservation of Tomatoes

Mercyline Ong'awa - Colletotrichum musae of Banana (Musa spp): Current State of Knowledge and Phyto-sanitary Practices towards minimizing Post-harvest Losses - Review

Discussion Session

OPENING SESSION SPEAKERS

HOST



Ambassador Josefa Sacko,
Commissioner for
Agriculture, Rural Development,
Blue Economy and Sustainable
Environment (DARBE)

MODERATOR



Dr. Janet Edeme
Head of Rural Development
Division (AUC)

HIGH LEVEL INVITED GUESTS



Ms. Betty Kibaara
Director
Rockefeller Foundation



Prof. Gitahi Kiama
Vice Chancellor
University of Nairobi



Dr. Hameed Nuru
World Food Program



Prof Ruth Oniang'o
Sasakawa Africa Association



Dr. David Phiri
FAO Representative to AU



Ms. Evelyn Geurtsen
Ministry of Agriculture, Nature
& Food Quality, Netherlands



Honorable Oumer Hussein
Minister of Agriculture, Ethiopia

LEAD/KEYNOTE SPEAKERS



Mr. Máximo Torero Cullen
Chief Economist UN FAO



Dr. Hans Hoogeveen
Champion 12.3



Prof. Umezuruike Linus Opara
Stellenbosch University

CHAIR: TECHNICAL COMMITTEE

CO-CHAIR - TECHNICAL COMMITTEE

3RD AAPHCE MODERATOR

RAPPORTEUR



Prof. Jane Ambuko,
University of Nairobi



Prof. Olaniyi Fawole
Johannesburg University



Dr. Douglas Ouma
Retouch Africa Consulting



Dr. Gloria Essilfie
University of Ghana

12.30 - 2.30 PM OFFICIAL OPENING SESSION

Moderator: Dr. Janet Edeme

Rapporteur: Prof. Olaniyi Fawole and Dr. Gloria Essilfie

REMARKS SESSION

- **Opening remarks from the Host AUC** - Amb. Josefa Sacko, Commissioner for Agriculture, Rural Development, Blue Economy and Sustainable Environment (DARBE) (10 mins)
- **Congress overview (10 mins)** - Technical Committee Chair - Prof. Jane Ambuko,
- Opening remarks from invited guests (8 guests, 3-5 minutes each)
 - **Ms. Betty Kibaara** (Director, Rockefeller Foundation)
 - **Prof. Stephen Kiama Gitahi** (Vice Chancellor, University of Nairobi)
 - **Prof. Ruth Oniang'o** (Sasakawa Africa Association)
 - **Dr. Hameed Nuru** (World Food Program)
 - **Dr. David Phiri** (Sub-Regional Coordinator for Eastern Africa and FAO Representative to AU)
 - **Ms. Evelyn Geurtsen** (Director International Agribusiness & Food Security at Netherlands Ministry of Agriculture, Nature & Food Quality)
- **Official Opening of the Congress** - Honorable Oumer Hussein, Minister of Agriculture, Ethiopia

TECHNICAL SESSION

- **Framing Presentation** on PHL Issues in the African Context - Prof. Umezuruike Linus Opara, Stellenbosch University, South Africa
- **Opening Keynote 1:** Mr. Máximo Torero Cullen - Chief Economist, UN Food and Agriculture Organization (FAO)
- **Opening Keynote 2:** - Dr. Hans Hoogeveen - FAO Independent Chairperson of the Council, Champion 12.3

Plenary Discussion

2.30 - 2.45 PM BREAK

PLENARY SESSION 1 SPEAKERS

LEAD SPEAKERS



Dr. Bruno Tran
IITA



Dr. Carola Fabi
UN FAO

PANELISTS



Prof. Sheila Okoth
University of Nairobi



Prof. Brighton Mvumi
University of Zimbabwe



Dr. Miezah Kodwo
KNUST



Dr. Oluwatoba Omotilewa
AfDB

MODERATOR



Dr. Tanya Stathers
Natural Resources Institute

RAPPORTEURS



Prof. Willis Owino
JKUAT



Dr. Kizito Nishimwe
University of Rwanda

2.45 - 4.14 PM PLENARY SESSION 1: SUBTHEME 1 FOCUS (Cost effective priority actions for Food Loss and Waste (FLW) measurement within Africa)

Session summary

Losses in the quantity or quality of food being produced, handled, transported, stored or processed can occur during each stage of the food supply chain with retailer, catering and consumer behaviours often resulting in further wastage of food. These losses occur for a myriad of different reasons, reflecting the huge diversity of food production and postharvest systems. These systems differ by commodity, location and intended use amongst other factors, and are shaped and transformed by complex interactions of various environmental, technical, economic, political, socio-cultural and demographic drivers. The scale of food loss and waste (FLW) differs depending on the commodity, location, type of food production and postharvest system. The loss and waste of food has economic, social and environmental impacts. These impacts vary depending on the extent, type and location of the food loss and waste (FLW).

Key development policies, including the African Union's Malabo Declaration and Sustainable Development Goal 12.3, clearly recognise the importance of reducing FLW and include targets for FLW reduction. However, the effective management and reduction of FLW requires an accurate and context-specific understanding of the causes, extent and impact of FLW. This subtheme provides a space to share and discuss recent work and learning on tools for and findings of measurements of food loss and food waste occurring within or of relevance to African food systems - in a range of different commodities, locations, and types of and stages within food systems across the African continent and beyond - to determine what our current knowledge and evidence base and gaps are regards the extent, causes and impacts of FLW.

Moderator: Dr. Tanya Stathers

Rapporteur: Dr. Kizito Nishimwe and Prof. Willis Owino

- Lead speaker
 - Dr. Bruno Tran** - International Institute of Tropical Agriculture (IITA)
 - Dr. Carola Fabi** - United Nations Food and Agriculture Organization (FAO)
- Panelists:
 - Prof. Brighton Mvumi** - University of Zimbabwe
 - Prof. Sheila Okoth** - University of Nairobi
 - Dr. Miezah Kodwo** - Kwame Nkrumah University of Science & Technology
 - Dr. Oluwatoba Omotilewa** - African Development Bank

Plenary Discussion

4.15 - 4.30 PM HEALTH BREAK

PLENARY SESSION 2 SPEAKERS

LEAD SPEAKERS



Dr. Mel Oluoch
Sasakawa Africa Association



Mr. Munhamo Chisvo
Jimat Development Consultants

MODERATOR



Dr. Dieudonne Baributsa
Purdue University

RAPPORTEURS



**Dr. Edoh Kukom
Ognakossan**
The World Vegetable
Center



Prof. Brighton Mvumi
University of Zimbabwe

4.30 - 6.00 PM PLENARY SESSION 1: SUBTHEME 1 FOCUS (Cost effective priority actions for Food Loss and Waste (FLW) measurement within Africa)

Session summary

The COVID-19 pandemic is a health emergency that has resulted in economic and food security crises around the world including Africa. This health crisis has impacted negatively, directly or indirectly, food availability and consumption due to the disruption of food value chains and slow-down of agricultural activities. The Covid-19 pandemic has exacerbated issues related to postharvest losses of perishable, semi-perishable and non-perishable crops such as vegetable and fruits, roots and tubers and as grain; respectively. Partial or full "lock-downs" have negatively impacted crop value chains leading to significantly high quantitative and qualitative losses leading in turn to economic and nutritional losses. In addition, supply chain of postharvest technologies and services (e.g., pesticides, storage devices, drying technologies, etc.) were also negatively impacted by Covid-19 measures. All this led to significant losses of food along crop value chains. It is important for us to learn from emergency disruptions - past and present (e.g., Ebola, Covid-19) to avoid policies and actions that would stifle progress made in postharvest management. In this session we hope to share experiences regarding 1) How are farmers, suppliers, manufacturers, and processors responding to the day-to-day disruptions caused by the pandemic (input and output market and postharvest management)? How are they affected by government policies. How are the development organizations, government agencies, academics, and others adapting under covid in dealing with postharvest management during the pandemic?

Moderator: Dr. Dieudonne Baributsa

Rapporteur: Dr. Edoh Kukom Ognakossan and Prof. Brighton Mvumi

- Lead Speakers
 - Dr. Mel Oluoch** - Sasakawa Africa Association
 - Mr. Munhamo Chisvo** - Jimat Development Consultants
- Break-away session for all participants to discuss specific questions prepared by the thematic group (30 minutes)

Plenary reporting and discussion

6.00 - 6.15 PM DAY TWO SESSIONS WRAP UP



DAY THREE
15TH SEPTEMBER 2021

8.45 - 11.00 AM PARALLEL SESSIONS (ORAL PRESENTATIONS)

Workstream 1B (Extent, Causes and Impacts of Food Loss and Waste of Durable Grain Crops)

Session Moderator: Dr. Tanya Stathers

Session Rapporteur: Dr. Kizito Nishimwe

ORAL PRESENTATIONS (10minutes each)

Delphine Mapiemfu-Lamare - Specificities of rice (*Oryza spp*) post-harvest practices and losses in Ndop hub, Cameroon

Aoga Antoine - Postharvest Loss Assessment along the Rice Value Chain in Bunkure LGA, Nigeria

Godfrey Wokorach - Mycotoxins occurrences among four staples food in northern Uganda

Ibrahim Muhammad Abdul - Postharvest Losses and Management Practices of Millet in Yobe State, Nigeria

Paul Houssou - Extent of and causes of cowpea grain postharvest losses under smallholder farmers' management in Benin

Joseph Galani - Determinants of postharvest losses of maize at producer level in different agroecology settings of Malawi and Tanzania

Ibrahim Kadigi - An economic analysis of food losses in the maize value chain in the South-West and Northern-Eastern parts of Tanzania

Kumera Neme - Postharvest Loss Assessment of Sesame (*Sesamum indicum L.*) Seeds in Ethiopia

Yonas Meheretu - Peri-urban pest rodents and storage losses in Northern Ethiopia

Julia Shuck - No Grain Left Behind: American Midwest Corn and Soy Harvest Efficiency Study

Discussion Session

Workstream 3F (Value Addition in Perishable Non-Crop Commodities to Reduce Food Loss and Waste)

Session Moderator: Dr. Rashid Suleiman

Session Rapporteur: Dr. Vijay Yadav

ORAL PRESENTATIONS (10minutes each)

Francis Appiah Adu-Amankwah - Effect of Processing Methods and Gamma Irradiation on the Quality and Shelf-Life of Squid (*Doryteuthis sibogae*)

Francis O. Wayua - Tomato Postharvest Handling Practices by Smallholder Farmers in Major Tomato Growing Areas of Kenya and Options for Loss Reduction

Klein Ileleji - Comparison of some Quality Parameters of Dried Fruit and Vegetable Crops using Open-Air Sun Drying and a Novel Portable Solar Dryer

Kwanele Nxumalo - Efficacy of chitosan edible coating functionalized with four medicinal plants extracts in alleviating shrivel and maintaining the quality of purple granadilla

Naphis Bitange - EFFECTS OF MODE AND TIMING OF CALCIUM APPLICATION ON TISSUE CALCIUM AND SHELF LIFE OF MANGO FRUITS

Olaniyi A. Fawole - Edible coatings for the sustainability of the fruit industry: case studies on strategic industry-university partnerships in South Africa

Adaeze Joy Ubaka - Small Scale Post-Harvest Practices: A Key to Sustainable Food System

Deirdre Holcroft - Protecting perishable crops with packaging: Evidence for reducing postharvest losses from the Ceres2030 scoping review

Discussion Session

Workstream 2 (Saving Africa's harvest during and post COVID-19 Pandemic - lessons learnt, opportunities to strategize for future natural disasters and pandemics)

Session Moderator: Prof. Brighton Mvumi

Session Rapporteur: Dr. Edoh Kukom Ognakossan and Dr. Charles Dhewa

ORAL PRESENTATIONS (10minutes each)

Abiola Ojeleye - The impact of COVID-19 pandemic lockdown on loss of tomato (*Lycopersicon lycopersicum*) fruit in South Western Nigeria

Adeyemi AJAO - Post-harvest handling of Smoked dried fish against insect pest and strategies during and post COVID-19 Pandemic in Africa: A Review

Ibrahim Baoua - Impact of covid-19 on input/output markets and implication for postharvest management

Charles Dhewa - Postharvest Markets and Access to Information under COVID-19 in Zimbabwe

Dieudonne Baributsa - Safeguarding food and seed assets in Sierra Leone during the Ebola crisis- Lessons for COVID-19

Hippolyte Affognon - COVID-19 pandemic and food losses in Mali

Ifesinachi Utazi - The Impact of COVID-19 Pandemic on Post-harvest Crops Regarding Sustainable Food Systems in Nigeria

Joseph J Mpagalile - Identification and understanding challenges and impacts of COVID-19 pandemic on food loss in Mali and Sierra Leone

Michael Brander - Improved storage mitigates vulnerability to food-supply shocks in smallholder agriculture during the COVID-19 pandemic

Munhamo Chisvo - Impact of COVID-19 on postharvest handling and storage of crop and animal products: implications on food and nutrition security in the SADC region

Discussion Session

11.00 - 11.15 AM BREAK

11.15 - 12.45 PM PARALLEL SESSIONS (POSTER PITCH)

Poster Session 1 (Extent, Causes and Impacts of Food Loss and Waste in Selected Vegetable, Fruit, Grain and Tree Crops)

Session Moderator: Dr. Kizito Nishimwe

Session Rapporteur: Dr. Rashid Suleiman

POSTER PRESENTATIONS - 3 minutes each

Birmaduma Gadisa - Why Ethiopian Meat Considered as Dark Cutting and Unsuitable for the Export Market: Lessons Learned from Production Scenario

Brown Gwambene - Perceptions and practices on postharvest management investment for resilient livelihoods in the Uporoto highlands of Tanzania

David Kofi Dokli - Examining Agronomic Data of Maize in Farmer-Fields: Koforidua Oyoko of Ghana and Pre- /Post-Harvest Loss Reduction in Perspectives.

Ebisa Oliko Keyata - Production, Handling practices, and utilization trends of some neglected plants in traditional farming systems of Benishangul-Gumuz Region of Ethiopia

Emmanuel Bamidele Tologbonse - Needs Assessment of Post-Harvest Management Practices Of Major Food Crops In Nigeria.

Khuthadzo Mugodo - Vegetable Losses Experienced by Smallholder Farmers in Gauteng Province of South Africa: Preliminary Study Findings

Kinde Lamessa - Physically Quality of Coffee (*Coffea arabica* L.) as Affected by Harvesting Methods and Drying Materials

Lamyaa Zelmat - Identification and assessment of the causes of onion (*Allium cepa* L.) postharvest losses in Khémisset region of Morocco

Marie Gorette Umuhoziho - Perception of Stakeholders on Postharvest Losses of Maize in Rwanda: The Main Causes and Potential Solutions

Mary Oyunga - Knowledge and perceptions on importance of post-harvest handling and value addition of the African Leafy Vegetable in western Kenya

Melkayo Geremu Abdissa - Causes of Postharvest Losses in Avocado Fruits, and Identification of Associated Fungal Pathogens in Hossana Town Market. Southern Nations, Nationalities and Peoples' Regional State of Ethiopia

Nezif Abamecha - Assessments of red pepper postharvest storage in Jimma zone Ethiopia

Discussion Session

Poster Session 2 (Scaling out of innovative postharvest technologies in sub-Saharan Africa: lessons and progress)

Session Moderator: Dr. Vijay Yadav

Session Rapporteur: Dr. Olubukola Odeyemi

POSTER PRESENTATIONS - 3 minutes each

Adegoke Adetoro - Physicochemical Attributes, Phytochemical Properties and Antioxidant Capacity of Dried Pomegranate (*Punica granatum*) Arils as Affected by Cultivar

Andrew Egala - Farmer2Consumer ICT4ag integrated application

Bernard Moonga - Reduction of postharvest losses of African indigenous vegetables using low cost storage technologies: Ethiopia mustard & Spider plant

Brenda Mora Kimang'a - Application of Botanical Treatments and Packaging Technologies in the Preservation of Postharvest Quality Of Tomatoes

Christine Kasichana Masha - Formulation, acceptability and nutritional value of cassava root - leaf flakes

Elohor Oghenechavwuko Udoro - Thermal and functional properties of chemically pre-treated cassava flour using response surface methodology

Emmanuel Kyereh - Challenges with Effective Packaging of Locally Processed Foods in Ghana

Esther K. Ateka - Effects of Fortifying Wheat- Sorghum Composite Flour with Omena (*Rastrineobola Argentea*) on Nutrient Composition of Biscuits

Esther Sakyi-Dawson - Use of Plantain Leaves and Plantain Pseudo-Stem as Low-Cost Packaging Material Option to Maintain Quality and Reduce Post-Harvest Losses in Plantain (*Musa paradisiaca*)

Francis Amoah - The need for adoption of improved technologies to address challenges in small-scale cassava processing in Ghana

Frank Sangija - Effect of lactic acid fermentation on nutritional and antinutritional compounds in African nightshade

Franklin N. Mabe - Field Crop Loss to Small Scale Mining in Ghana: Coping Strategies for Sustainable Food Supply

Funmilayo Mary Oloyede - The Effect of Storage Periods on Selected Nutritional Values of Pumpkin Fruits (*Cucurbita pepo* Linn.)

Gemechu Geleta - Assessment of Handling Practices, Physicochemical and Microbiological Quality of Honey along the Supply Chain from Gera District to Jimma Town, Southwestern Ethiopia

George Obeng-Akrofi - Application of the Analytic Hierarchy Process in the Selection of a Storage Bag for Shea Nuts Storage in Ghana: Case Study of Ullo, a Shea Growing Community in Northern Ghana

George Obeng-Akrofi 2 - Selection of an Appropriate Biomass Burner for Drying Maize in a Column Dryer Using the Analytic Hierarchy Process (AHP)

Gilberthe Uwera Benimana - Impact of Hermetic Maize Storage Technology Adoption on Smallholder Farmers' Income in Gatsibo District, Rwanda.

Grace Gachara - *Aspergillus* Colonization and Aflatoxin Contamination of Post-harvest Maize in East Africa: Systematic Review and Present Status

Harun Odhiambo - *Colletotrichum gloeosporioides* Damage in Avocado (*Persea americana*): Integrated Phyto-sanitary Approaches towards Sustainable Postharvest Management - Review

Rene Oostewechel - Postharvest Standard Operating Procedures; The basis for loss reduction, new trading systems, financing and training

Discussion Session

Poster Session 3 (Scaling out of innovative postharvest technologies in sub-Saharan Africa: lessons and progress)

Session Moderator: Ing. Joseph O. Akowuah

Session Rapporteur: Dr. Gloria Essilfie

POSTER PRESENTATIONS - 3 minutes each

Issah Sugri - Improving Postharvest Operations and Efficiency in Northern Ghana: The Case of Maize Threshing Machines

James Ndambuki Musyoka - Improved Precooling Technology for Extending Shelf life of Perishable Agri-Produce in Kenya

Joel Kapsiya - Reducing Postharvest Losses-A Panacea to Sustainable Food Security in Nigeria (A Conceptual Review)

Judith Okolo - Edible Coating Preservation for Tropical Fruits: A Sustainable Health and Eco-Friendly Technique

Justa Kathambi - Effect of Coolbot™ Cold Storage and Modified Atmosphere Packaging on Shelf Life and Postharvest Quality of Kale.

Oluwatosin Kareem - Comparative Evaluation of the Effects of Pretreatments on the Nutritional and Chemical Properties of Ginger Leaf-Based Herbal Tea

Karen Wambui - Evaluation of the effect of Harvest Stage and Nitrogen Fertilization on Postharvest Shelf life of Black Nightshades (*Solanum nigrum*) and Kales (*Brassica oleracea* var. *acephala*).

Mandeep Sharma - Postharvest Loss Initiatives in Palm Oil for TRIDOM with Focus on Cameroon

Maryam Adegboyega - Food Waste Management in Reducing Economic Burden of Post-Harvest Loss (PHL) In Africa

Nasser Kasozi - Nutrient composition of fish protein powder developed from *Brycinus nurse* (Rüppell, 1832)

Njilar Rita Mungfu - Assessment and Characterization of Existing Postharvest Handling Techniques of Malay Apple (*Syzygium Malaccense* [L.] Merr & Lm Perry) in the Mount Cameroon Region

Olubukola Odeyemi 2 - Functional properties and food applications of African star apple (*Chrysophyllum albidum*)

Olumuyiwa Babarinsa - Postharvest Deterioration and Biochemical Changes in Biofortified Cassava Stored in an Evaporative Cooling Structure

Pankaj B. Pathare - Bruise susceptibility and quality attributes of banana affected by mechanical impact and storage

Patience Ujiro Odueme - Effect of Harvest Maturity Stage and Storage Media on the Harvest Quality of Tomato (*Lycopersicon esculentum* Mill)

Poornima Nagaraj - Effective Hermetic Storage Solution in Preventing Postharvest Losses of Food Grains

David T. Ishola - Inclusion of *Andrographis paniculata* Leaf into Wheat-Pearl Millet based Flour Blends: An Index Effects of the Inclusion and Blends Nutritive Values.

Wolfgang Mittmann - A scalable, digital platform for grain storage and trading eliminates post-harvest losses and allows smallholders and rural entrepreneurs to increase incomes

Willis Owino - Maturity Indices of Specific Mango Varieties produced at medium altitude agro-ecological zone in Kenya

Martin Aluga - Green Nanomaterials for Post-Harvest Management of Fruits and Vegetables

Augna Bikila - Drying Behavior of Anchote (*Coccinia Abyssinica* (Lam.) Cogn.) Tuber Slices as Affected by Pre-drying Treatments and Drying Temperature

Discussion Session

12.45 - 1.00 PM BREAK

PLENARY SESSION 3 SPEAKERS

LEAD SPEAKERS



Dr. Damian Ihedioha
African Development Bank



Mr. Heiko Furing
Buhler Group

PANELISTS



Dr. Deirdre Holcroft
Holcroft Postharvest
Consulting



Dr. Lisa Kitinoja
Postharvest Education
Fdn



Mr. Andrew Gatheca
Global Development
Incubator



Mr. Nnaemeka Ikegwuonu
ColdHubs Ltd, Nigeria

MODERATOR



Mr. Brett Rierson
Harvest Agricultural Solutions

RAPORTEURS



Ing. Joseph O. Akowuah
KNUST



Dr. Vijay Yadav
The Postharvest Education
Foundation

1.00 - 2.30 PM PLENARY SESSION 3: SUBTHEME 3 FOCUS (Scaling out of innovative postharvest technologies in sub-Saharan Africa: lessons and progress)

Session summary

One of the main global challenges for agricultural research and development is to sustainably and innovatively reduce postharvest loss and food waste (PHL-FW) within the global food system and provide safe and nutritious food for a growing population. The session on innovative technologies, tools, practices and training/capacity building seek to highlight recent developments and efforts in the sector to address PHL-FW in food supply chains. The ultimate goal is to put the spotlight on scalable innovative technologies and practices that can address the challenges faced by smallholder farmers and other value chain actors, with respect to postharvest loss (PHL), reduction. The session will recommend technologies and practical solutions and innovative scaling up strategies for available resources to reduce PHL-FW in Africa.

Moderator: Mr. Brett Rierson

Rapporteur: Ing. Joseph O. Akowuah and Dr. Vijay Yadav

- Lead Speakers
 - Mr. Heiko Furing** - Buhler Group
 - Dr. Damian Ihedioha** - African Development Bank (AFDB)
- Panelists
 - Dr. Deirdre Holcroft** - Holcroft Postharvest Consulting
 - Dr. Lisa Kitinoja** - Postharvest Education Foundation
 - Mr. Andrew Gatheca** - Global Development Incubator, Kenya
 - Mr. Nnaemeka Ikegwuonu** - ColdHubs Ltd, Nigeria

Plenary Discussion

2.30 - 2.45 PM BREAK

PLENARY SESSION 4 SPEAKERS

LEAD SPEAKER



Ms. Victoria Madedor
Bank of Industry Investment &
Trust Co Ltd, Nigeria

PANELISTS



Mr. Benjamin Kusi
Self-Help Africa



Prof. Enock Stanley Ugulumu
Micro Finance Institute,
Tanzania



Dr. Edward Agaba
AGRA



Mr. Michael Obanubi
Wellspring Development
Capital

MODERATOR



Dr. Dirk E. Maier
Iowa State University

RAPORTEURS



Ms. Karen Munoko
FARA



Prof. Klein Ileleji
Purdue University

2.45 - 4.15 PM PLENARY SESSION 4: SUBTHEME 5 FOCUS (Innovative Financing Mechanisms for Upscaling Postharvest Interventions)

Session summary

Postharvest food loss is a global problem with huge economic and nutritional consequences. In a bid to counter this challenge, a number of institutions from around the world have developed innovative and unique approaches to financing the upscaling of appropriate mitigation strategies and interventions. Access to affordable credit and the very high interest rates for the lending schemes available are the greatest limitations. This session seeks to put the spotlight on the innovative ideas the panelists' organizations have successfully implemented, and the real-world impact they have on smallholder farmers, their families and communities. These scalable solutions and strategies are helping to unlock the challenges faced by smallholder farmers and other value chain actors with respect to post-harvest loss (PHL) reduction and financing PHL interventions taking into account the peculiar local context of agribusinesses and the financial sector in Africa.

Moderator: Dr. Dirk E. Maier

Rapporteur: Ms. Karen Munoko and Prof. Klein Ileleji

Lead Speaker: Ms. Victoria Madedor - Group Head Agribusiness & FMCG, Bank of Industry Investment & Trust Co Ltd, Nigeria.

- Panelists

Mr. Benjamin Kusi - Self-Help Africa

Prof. Enock Stanley Ugulumu - Micro Finance Institute, Iringa, Tanzania

Dr. Edward Agaba - Alliance for a Green Revolution in Africa (AGRA)

Mr. Michael Obanubi - Director, Finance and Economics, Wellspring Development Capital, Bristol, United Kingdom

Plenary Discussion

4.15 - 4.30 PM BREAK

4.30 - 7.00 PM Postharvest Innovation Lab Sponsored Special Session

Day 3 Wrap up

DAY FOUR
16TH SEPTEMBER 2021

8.45 - 11.00 AM PARALLEL SESSIONS (ORAL PRESENTATIONS)

Workstream 4 (Trade, business and economic transformation opportunities in postharvest solutions)

Session Moderator: Prof. Klein Ileleji

Session Rapporteur: Dr. Scott Bellows and Karen Musikoyo

ORAL PRESENTATIONS (10minutes each)

Duke Omayio - Opportunities and challenges in processed local fruits and vegetables: the case of small-scale Food Processors among Kenya farmers

Etse Yawo Dzakpa - Exploring circular bioeconomy of selected vegetables postharvest in West Africa.

Gideon E. Onumah - Trade, business and economic transformation opportunities at postharvest: the case of the Sorghum VC in Northern Ghana

Heike Axmann - Promising climate smart business cases for smallholder rice farmers in Nigeria by introducing mechanization

Lila Cardell - Farmers opt out of storage because its risky - a new explanation for a long-standing puzzle

Olufunke Adebola - Market based approaches for postharvest loss reduction in Northern Ghana

Roberta Lauretti-Bernhard - Business Opportunities for Improving Food Safety and Postharvest Loss in Ethiopia, Rwanda and Senegal

Seydou Zakari - The drivers of smallholder market participation in the Sahel, Niger

Discussion

Workstream 5 (Financing postharvest loss reduction initiatives; business cases/models in postharvest loss reduction; innovative financing mechanisms for upscaling postharvest interventions)

Session Moderator: Dr. Augustine Okoruwa

Session Rapporteur: Mr. Hory Chikez

ORAL PRESENTATIONS (10minutes each)

Aggrey Siya - Climate change perceptions and adaptation by Sebei pastoralists, Mt Elgon, Uganda

Daudi Mungule Chikoye - Business Models in Postharvest Loss Reduction

Joseph O. Akowuah - Economic and Financial Analysis of A Flatbed Dryer for Maize Drying Using Biomass Heat Source

Lukas Stiefel - Adoption and Impact of Hermetic Storage Bags - Experimental Evidence from Smallholders in Ethiopia

Michael Obanubi - Business opportunities to reduce post-harvest loss of nutritious foods: Modelling the return on investment of field-ready technologies in Nigeria.

Susan Ndung'u - Willingness to accept compensation for a shift to contamination free vegetable production by urban and peri-urban farmers in Nairobi, Kenya

Samuel Danilola - Consumers' perception and willingness to pay for processed fluted pumpkin in Northcentral, Nigeria

Discussion Session

Workstream 6 (Enabling policies, effective national/regional strategies, experience sharing, Collaborating, Learning and Adapting)

Session Moderator: Mr. Cephass Taruvinga

Session Rapporteur: Mr. Joseph Mpangalile

ORAL PRESENTATIONS (10minutes each)

Dorcas Tawonashe - Role of Policy on Minimizing Post-Harvest and Food losses

Fernando Vinícius da Rocha - Food security efficiency metrics: a cross country comparison

Fernando Vinícius da Rocha - Postharvest Loss, ICT, New Technologies and Alternative Practices: a Bibliometric and Network Analysis

Mexford Mulumpwa- A call for women inclusiveness in fish value chain in Malawi

Monica Ermolli - Understanding awareness and policy context for reducing mycotoxin contamination and food and feed losses in African

Naftaly Mwirigi - Heavy metal concentrations in small pelagic fish from Lake Victoria, Kenya: The case of Dagaa fishery

Brighton M. Mvumi - Status of Postharvest Management Policies in sub-Saharan Africa

Epiphanie Karekezi - Combating Aflatoxin in the maize value chain in Rwanda

Gebre Garmame Galgaye - Household Level Food Security and Livelihood Diversification in Pastoral Districts of Guji, West Guji, and Borena Zones, Southern Ethiopia

Hysum Ibrahim Mohammed Muhmode - Socio-economic Impact of the Postharvest Loss project on Smallholder Farmers Welfare, Food Security and Awareness in Sub-Saharan Africa

Discussion Session

11.00 - 11.15 AM BREAK

11.15 - 12.45 PM PARALLEL SESSIONS (ORAL PRESENTATIONS)

Workstream 1C (Food Loss and Waste Data and Socio-Economic and Environmental Impacts)

Session Moderator: Dr. Kizito Nishimwe

Session Rapporteur: Dr. Rashid Suleiman

ORAL PRESENTATIONS (10minutes each)

Hory Chikez - Life Cycle Assessment (LCA) of mango cold storage technologies in Kenya

Yigezu A. Yigezu - Food loss and waste in Egypt and Morocco: implications for food and energy security, resources, and greenhouse gas emissions

Thiago Guilherme Péra - An analysis of postharvest grain losses in Brazil under different sustainability metrics

Tanya Stathers - Examining legume postharvest loss data to expand the crop coverage of the African Postharvest Losses Information System (APHLIS)

Sharon Mayienga - Research on the measurement of harvest and post-harvest losses; Minimum Losses by Commodity and Region: Insights from the Literature

Jan Broeze - Fast screening method for food loss assessment to stimulate adoption of loss-reducing interventions

Theresa N. Ngoma - Addressing Participants' Subjectivity during Physical Measurement of field Postharvest Losses: Proposed Approaches

Jacob Ricker-Gilbert- The Economics of Post-Harvest Loss and Loss-Preventing Technologies in Developing Countries

Discussion Session

Workstream 3G (Postharvest Entomology, botanical applications)

Session Moderator: Prof. Archileo Kaaya

Session Rapporteur: : Ing. Joseph O. Akowuah

ORAL PRESENTATIONS (10minutes each)

Mubayiwa Macdonald - Field evaluation of hermetic and synthetic pesticide-based technologies in smallholder sorghum grain storage in hot and arid climates

Mubayiwa Macdonald - Field evaluation of alternatives to synthetic pesticides in cowpea (*Vigna unguiculata* (L.) Walp) grain storage under contrasting climatic conditions

Tigist Kefale - Cost-Benefit Analysis of Purdue Improved Crop Storage Bags for Maize Storage among Smallholder Farmers in Northwest Ethiopia

Winifred Atugonza - Effect of triple-layer hermetic bags on the biochemical and physicochemical characteristics of whole and degermed maize flour in Uganda

Mekbib Hilegebrile Seife - Available and Affordable Postharvest Loss Reduction Technologies: Experiences from Ethiopia

Mekbib Hilegebrile Seife - Postharvest losses of tomatoes and the impact of reusable plastic crate technology on profitability of tomato fruits in Ethiopia

Discussion Session

Workstream 3H (Capacity Building Initiatives/Approaches for PHL management and control)

Session Moderator: Prof. Margaret Hutchinson

Session Rapporteur: Dr. Vijay Yadav

ORAL PRESENTATIONS (10minutes each)

Aditya Parmar - Enhancing the Shelf-Life of Fresh Cassava Roots: A Field Evaluation of Simple Storage Bags

Desta Dugassa Fufa - Effect of Using Plant Extract with Coating Material on Physicochemical Quality of Tomato Fruit (*Solanum lycopersicum* L.) Stored at Ambient Temperature

Issoufou Amadou - Hermetic bags preserve the quality of dried fruits (*Ziziphus mauritiana* (L)) in Niger

Emmanuel Amwoka- Evaluation of the Effectiveness of Low-Cost Cold Storage Options to Preserve Postharvest Quality of Mango

Anurag Dagar - Tomato fruit skin defects and their contribution to postharvest losses

Discussion Session

12.45 - 1.00 PM BREAK

PLENARY SESSION 5 SPEAKERS

LEAD SPEAKERS



Mr. Komla Bissi
AUC



Dr. Divine Njie
FAO

PANELISTS



Ms. Dorcas Tawonashe
Ministry of Agriculture
Zimbabwe



Dr. Honest Kessy
Ministry of Agriculture
Tanzania



**Dr. Mohyeldeen
Eltohami Taha**
IGAD



Mr. Esayas Lemma
Ministry of Agriculture
Addis Ababa, Ethiopia

MODERATOR



Dr. Martin Bwalya
CAADP

RAPPORTEURS



Mr. Cephas Taruvinga
Postharvest Consultant



Mr. Joseph Mpangalile
FAO

1.00 – 2.45 PM **PLENARY SESSION 5: SUBTHEME 6 FOCUS** (Enabling policies, effective national/regional strategies, experience sharing, Collaborating, Learning and Adapting)

Session summary

RECs and AU member states are mandated to develop strategies and programs aligned to the Malabo PH loss reduction road map to achieve national and regional targets for the Malabo PH loss reduction goal. Cognizant of that, some regional bodies and AU member states have developed post-harvest management strategies aligned to the AU Malabo Road map.

The session on “Enabling policies, effective national/regional strategies, experience sharing, collaborating, learning and adapting” seek to understand and review how countries and regional bodies have progressed in their efforts to achieve their Malabo PHL reduction targets. Also, the session would like to understand the extent and challenges in providing technical support in policy development and implementation.

The session will identify challenges and lessons learned and recommend practical solutions to member states and regional bodies on aligning their PHL reduction targets and efforts to the Malabo PHL goal.

Moderator: Dr. Martin Bwalya

Rapporteur: Mr. Cephas Taruvinga and Mr. Joseph Mpagalile

- **Lead speakers**

Mr. Komla Bissi - African Union Commission (AUC)

Dr. Divine Njie - United Nations Food and Agriculture Organization (FAO)

- **Panelists**

Dr. Honest Kessy - Director of Food Security Department, Ministry of Agriculture Tanzania

Dr. Mohyeldeen Eltohami Taha - Program Manager for Agriculture & Food Security, IGAD

Ms. Dorcas Tawonashe - Deputy Director Strategic Policy Planning, Ministry of Agriculture Zimbabwe

Mr. Esayas Lemma - Director, Directorate of Crops, Ministry of Agriculture, Addis Ababa, Ethiopia

Plenary Discussion

CLOSING SESSION SPEAKERS

MODERATOR



Dr. Lindiwe Sibanda
ARUA Centre of Excellence in
Sustainable Food Systems, University of
Pretoria South Africa/Champion 12.3

RAPORTEURS



Prof. Olaniyi Fawole
University of Johannesburg



Prof. Margaret Hutchinson
University of Nairobi

PANELISTS



Dr. Craig Hansen
WRI



Dr. Dirk Maier
IOWA State University



Dr. Rosa Rolle
UN FAO



Mr. Cephas Tarvinga
Postharvest Policy Consultant



Prof. Linus Opara
Stellenbosch University

CLOSING REMARKS



H.E. Mr. Henk Jan Bakker
Ambassador of the Netherlands



Dr. Boaz Keizire Blackie
Alliance for a Green Revolution
in Africa (AGRA)



Dr. Mohyeldeen Eltohami Taha
IGAD

2.45 - 4.15 PM CLOSING PANEL DISCUSSION - The Roadmap to Realization of Malabo 2014 and SDG 12.3 Targets

Session summary

There have been concerted efforts from all stakeholders to reduce food loss and waste to contribute towards achieving food and nutrition security in sustainable food systems. In the United Nation's Sustainable Development Goals (SDGs), under the goal on sustainable production and consumption, SDG 12, a target has been set to 'halve per capita global food waste at the retail and consumer levels and reducing food losses along production and supply chains (including postharvest losses) by 2030'. The Africa Union under the Malabo Declaration (2014) has a target to halve postharvest losses by the year 2025. To realize these targets, there is a call to action by all stakeholders including Governments/policy makers, private actors in the food supply chain, development agencies, civil society, researchers/academia, consumers - actually all of us have a role to play. In this panel discussion we will explore the Roadmap to Realization of Malabo 2014 and SDG 12.3 Targets - who needs to do what/how/when for us to realize the set targets?

Moderator: Dr. Lindiwe Sibanda (Director and Chair: ARUA Centre of Excellence in Sustainable Food Systems, University of Pretoria South Africa/Champion 12.3)

Rapporteur: Prof. Olaniyi Fawole and Prof. Margaret Hutchinson

DISCUSSANTS

Dr. Prof. Dirk Maier - Consortium for Innovations in Postharvest Loss and Food Waste Reduction

Mr. Cephas Taruvinga - Postharvest Policy Consultant

Dr. Rosa Rolle - United Nations Food and Agriculture Organization (FAO)

Dr. Craig Hansen - World Resources Institute, Champion 12.3

Prof. Umezuruike Linus Opara - Stellenbosch University, South Africa

4.14 - 5.30 PM CLOSING SESSION

Moderator: Dr. Douglas Ouma

- Reading of the Congress Communique
- Award of Prizes - Sponsor (Consortium for Innovations in Postharvest Loss and Food Waste Reduction)
- Vote of thanks - Host (AUC)
- Closing Remarks

H.E. Mr. Henk Jan Bakker, Ambassador of the Netherlands

Dr. Boaz Keizire Blackie - Alliance for a Green Revolution in Africa (AGRA)

Dr. Mohyeldeen Eltohami Taha - Program Manager for Agriculture & Food Security, IGAD



**ADDENDUM:
SIDE EVENT
PROGRAMS**



PROGRAMME

“SCALING UP POST-HARVEST REDUCTION PROGRAMMES IN AFRICA”

Organized by the World Food Programme (WFP)

Monday, 13 September 2021, 9:00-11.30 am EAT

Venue: Virtual

DRAFT PROGRAMME

- **OPENING OF THE SIDE-EVENT (10 minutes)**

WELCOME REMARKS by **Dr J. Chris Toe**, Senior Advisor for Corporate and Country Engagement, UN World Food Programme

- **KEYNOTE MESSAGE (15 minutes)**

Mr. Michael Dunford, Regional Director for Eastern Africa, UN World Food Programme (WFP)

PANELLIST SESSION (70 min)

Moderator: Dr J. Chris Toe, Senior Advisor for Corporate and Country Engagement, UN World Food Programme

1. **Adebowale Akande** | Senior Specialist and Head of Agribusiness and Mechanisation | International Institute of Tropical Agriculture
 - o Experiences in food loss and waste reduction at the IITA and other Africa-based CGIAR institutions
2. **Rosa Rolle** | Team Leader, Food Loss and Waste | UN Food and Agriculture Organization
 - o Challenges and opportunities for reducing food loss and waste in Africa in the context of sustainable food systems.
3. **Bernard Kowatsch** | Head of the Innovation Accelerator | UN World Food Programme
 - o Role of Private Sector in PHL and innovative approaches to reducing postharvest losses among smallholder farmers
4. **Sibi Lawson Marriott** | Regional Adviser for Climate Change Adaptation, Resilience-Building and Gender Equality | UN World Food Programme Regional Bureau for East and Central Africa
 - o WFP’s experience in addressing post-harvest loss reduction in the East Africa region: impacts and challenges and opportunities for scaling up
5. **Manyewu Mutamba** | Head (Ag) of Food Systems and Rural Resources | African Union Development Agency (AUDA-NEPAD)
 - o Continental policies and programmes for food loss and waste reduction and their domestication by Member States

- **OPEN DISCUSSION (45 minutes)**

QUESTIONS & ANSWERS by Floor Participants & Panel Members

- **CLOSING OF MEETING (10 minutes)**

Dr J. Chris Toe, Senior Advisor for Corporate and Country Engagement, UN World Food Programme

Forum for Agricultural Research in Africa (FARA)

"A Science-Business Forum in Post-Harvest Management"

Organized by the Forum for Agricultural Research in Africa (FARA)

Draft Program - September 13, 2021

12:00 EAT-14:30 EAT

<p>11:45 to 12:00</p>	<p>Login & House Keeping rules</p> <p>Facilitation and Orientation with moderator, speakers, panellists, interpreters, rapporteurs</p> <p>Moderator - Dr. Scott Bellows</p>	<p>Munoko Karen and Dr. Scott Bellows</p>
<p>30 minutes</p>	<p>Panel session 1 - Orientation, Welcome & Keynote address</p> <p>Partnerships for increasing deployment of science, technology, and innovation to improve the profitability and competitiveness of agribusinesses in Africa, with a focus on reduction of post-harvest losses.</p> <p>Welcome and opening remarks from Dr. Yemi Akinbamijo, Executive Director of FARA</p> <p>Keynote address from Dr. Alioune Fall, Chairperson, FARA Board of Directors</p> <p>Keynote address from Dr. Martin Fregene, Director Agriculture African Development Bank</p>	<p>Dr. Scott Bellows and</p>
<p>40 minutes</p>	<p>Panel session 2 - Presentations from speakers</p> <p>Contributions of science and technology in strengthening local agribusiness processes with a national and regional view of reducing post-harvest losses in Africa</p> <p><u>Speakers:</u></p> <ol style="list-style-type: none"> Mr. Mark Maessack - Regional Director for East and Central Africa: USAID Mr. Antony Kanyoku - COO eGranary, East Africa Farmer Federation Dr Rebbie Harawa - Regional Director for Eastern & Southern Africa: ICRISAT 	<p>Dr. Scott Bellows</p>
<p>10 minutes</p>	<p>Poll questions</p> <ol style="list-style-type: none"> Strengthening partnerships among researchers, extension, farmers, and private sector will <ol style="list-style-type: none"> Reduce post harvest losses among farmers (Yes, No, Not sure) Increase profitability of services/business among farmers (Yes, No, Not sure) How do you foresee these partnerships help with post-harvest management? <ol style="list-style-type: none"> Working through partnerships triggers business development around post harvest technologies This can happen with increased investments in agricultural innovation systems None of the above I am not sure 	<p>Munoko Karen and Dr. Scott Bellows</p>
<p>60 minutes</p>	<p>Panel session 3 - Panel Discussion</p> <p>Approaches for increasing deployment of science, technology, and innovation to improve the profitability and competitiveness of agribusinesses in Africa, with a focus on reduction of post-harvest losses (at the individual, institution and/or systemic level)</p> <p><u>Panellists:</u></p> <ol style="list-style-type: none"> Mr. Nana Osei Bonsu - CEO of the Ghana Private Enterprise Federation Dr. Monica Olala - Agricultural Sector Development Program, Ministry of Agriculture - Kenya Dr. Joao Mutondo - Edward Mondlane University in Mozambique 	<p>Munoko Karen and Dr. Scott Bellows</p>
<p>10 minutes</p>	<p>Closing remarks</p>	<p>Dr. Yemi Akinbamijo</p>



AGENDA - 13TH September 2021, 12h00 - 14h30

Innovative technologies to reduce postharvest losses in the wheat, maize and rice supply chain.

- 12:00** Welcoming speech introduction of all participants

- 12:10** Who we are?

- 12:20** Integration of small holder farmers in the food value chain

- 12:35** Q & A or Video
- 12:45** Cooperation between the flour milling industry and the farmers

- 13:00** Q & A or Video
- 13:10** Cooperation between the corn milling industry and the farmers

- 13:25** Q & A or Video
- 13:35** Cooperation between the rice milling industry and the farmers

- 13:50** Q & A or Video
- 14:00** TGI Group, How to deal with small holding farmers

- 14:20** Q & A

- 14:30** End of the side event

Strengthening African Processors (SAP)



Session Title: Hub-and-Spoke Food Innovation System for Urban and Rural Food Processing and Nutrition

Session Description:

The Hub-and-Spoke Food Innovation System is an innovative model for the dissemination of food and nutrition technologies and strengthening of food processing enterprises. This session will provide an overview of efforts of Purdue University and its partners to develop the Hub-and-Spoke Food Innovation System and highlight case studies of its impacts on the ground. The session will also provide insight into how the Hub-and-Spoke System works to expand the adoption of advanced processing technologies and techniques, support entrepreneurship, empower women and youth, improve nutrition, and expand local markets.

Agenda

Time: 3:00 – 5:30 EAT

Time	
Hub-and-Spoke Food Innovation System for Urban and Rural Food Processing and Nutrition	
3:00-3:15	Inception and organization of the Hub-and-Spoke Food Innovation System Bruce Hamaker, Distinguished Professor of Food Science, Purdue University
3:15 – 3:30	Implementation of the Hub-and-Spoke in West Africa Moustapha Moussa, INRAN
3:30 -3:45	Market-led Nutrition using the Hub-and-Spoke John Taylor, Professor of Food Science, University of Pretoria
3:45 – 4:00	Q&A
Lightning Talks – Research from the Hubs	
4:00-4:30	Short talks from researchers working within the Hubs Case Studies: Learnings from the Field
4:30-4:45	The Mango Value Chain: University of Nairobi Jane Ambuko, Professor of Horticulture and Postharvest Specialist, University of Nairobi
4:45 -5:00	The Maize Value Chain: Nelson Mandela African Institution of Science and Technology Edna Makule, Head of Research and Innovation Unit, Nelson Mandela African Institution of Science and Technology
Panel Discussion	
5:00 – 5:30	A moderated panel discussion

The African Postharvest Losses Information System (APHLIS)



APHLIS: a tool to support postharvest loss reduction

Monday, 13 September 2021

15:00-17:30 EAT

This side event is open to all AAPHCE participants.

Introduction

Substantial crop losses occur at various stages along the postharvest value chain. The African Union's Malabo Declaration and the United Nations Sustainable Development Goals call on countries to significantly reduce postharvest losses by the end of the decade. Understanding the magnitude of postharvest loss, the points in the value chain where losses occur, and the causes and impacts of loss helps decision-makers formulate effective policies and invest in successful postharvest loss programmes. Yet many countries currently lack the means to measure and monitor postharvest losses.

The African Postharvest Losses Information System (APHLIS) (www.aphlis.net) supports decision-making to reduce postharvest food losses. This side event will show participants how to use APHLIS to quantify postharvest losses of staple crops, to understand their economic and nutritional impact, and to consider the policy and programmatic applications of postharvest loss information.

Approach

The side event will use a learning lab approach to engage participants in innovative learning, practice, and reflection. The programme includes short presentations on the features and functions of APHLIS; the role that APHLIS can play to help countries measure postharvest losses and meet their Malabo reporting requirements; and efforts to provide early warning information on climate-based risks of mycotoxin contamination. Interactive breakout group activities will bring participants together to explore APHLIS and to learn how it can be used to calculate postharvest losses and the nutritional and financial dimensions of such losses.

Learning outcomes

Following the session, participants will be able to use APHLIS to determine postharvest losses for staple food crops at national and subnational level across sub-Saharan Africa countries, including percentage weight loss, loss in tonnes and the nutritional and financial impacts of such losses. Participants will understand how such information can be used in:

- agricultural policy formulation
- strengthening value chains
- improving food security
- monitoring loss reduction activities
- monitoring agricultural input efficiency
- assessing the impact of food production on the environment.

For further information, contact:

Tanya Stathers t.e.stathers@gre.ac.uk or info@aphlis.net

Consortium for Innovation in Post-Harvest Loss and Food Waste



Side Event Title, Date & Time	Training the Next Generation of Food System Leaders and Researchers Monday, September 13, 2021 6:00 – 8:30 p.m. EAT
Zoom Link	https://us06web.zoom.us/webinar/register/WN_cnTGEHBCQu-8GSy_oa4CmQ
With support of	<ul style="list-style-type: none">• Consortium for Innovation in Post-Harvest Loss & Food Waste Reduction• Rockefeller Foundation• Foundation for Food and Agricultural Research

Session outline

1 -Session title

Training the Next Generation of Food System Leaders and Researchers

2 -Session summary

The Consortium for Innovation in Post-Harvest Loss and Food Waste Reduction is committed to training the next generation of food system leaders and researchers. The Consortium is composed of leading institutions in the Americas (Iowa State University, University of Maryland, Zamorano Pan-American Agricultural School, University of São Paulo), Europe (Wageningen University and Research), Middle East (Volcani Center), and Africa (University of Nairobi, Kwame Nkrumah University of Science and Technology, Stellenbosch University). Undergraduate and graduate students from these institutions are conducting innovative research that improves storage and distribution, develops tracking and monitoring, minimizes spoilage through pre- and post-harvest innovation, and changes behavior to reduce post-harvest loss and food waste reduction (PHL-FW). Speakers will present their research findings and share how they are positively impacting the sustainable reduction of PHL-FW and improving livelihoods throughout the world.

3 -Moderator and Speakers

Moderators: Joseph Akowuah, Kwame Nkrumah University of Science and Technology
Wendy White, Iowa State University

Speakers: Ma Cristine Concepc Ignacio, Iowa State University
Loretta Oduro, Kwame Nkrumah University of Science and Technology
Chijioke Nkwocha, Stellenbosch University
Epiphany Karekezi, University of Rwanda
Emmanuel Amwoka, University of Nairobi

FEED THE FUTURE INNOVATION LAB FOR THE REDUCTION OF POST-HARVEST LOSS



Feed the Future Innovation Lab for the Reduction of Post-Harvest Loss hosted Side Event:

Research and impact from across the Innovation Labs

Summary:

The Feed the Future Innovation Lab community work to help achieve the Global Food Security Research Strategy objectives: Promote inclusive, sustainable agriculture-led economic growth that reduces global poverty, hunger and undernutrition, particularly among women and children; Build resilience among vulnerable populations and households to food shocks while reducing reliance upon emergency food assistance; Improve nutritional outcomes, especially among women and children, with a focus on reducing child stunting, including through the promotion of highly nutritious, safe foods, diet diversification and nutritional behaviors that improve maternal and child health. Findings and success stories will be highlighted from six different Innovation Labs, and a facilitated discussion focused on scaling innovations with inclusive benefits will ensue.

- 1) Post-Harvest Loss Innovation Lab: securing the harvest for inclusive benefits (Ethiopia, Ghana, Malawi)
- 2) Fish Innovation Lab: Analysis of the aquaculture post-harvest chain in Nigeria
- 3) Nutrition Innovation Lab: Maternal aflatoxin exposure decreases infant weight and WAZ at birth whereas exposure from breastmilk was not associated with any growth impairments from 3 to 6 months in exclusively breastfed infants in Uganda
- 4) Feed the Future Innovation Lab for Food Processing and Post-harvest Handling: Integrating Research, Extension and Commercialization to Reduce Post-harvest Losses
- 5) Legume Systems Innovation Lab: Education at the last mile: Scaling appropriate PHL prevention technologies across cultures, languages, literacy levels, and deployment pathways.
- 6) Lessons learned as the Chief of Party for an Innovation Lab Buy-In (Horticulture Innovation Lab in Guinea) and facilitated discussion. Mamadou Thiam, formerly with the Horticulture Innovation Lab, currently with the Post-Harvest Loss Innovation Lab.

EXHIBITORS PROFILES



University of Nairobi

UNIVERSITY OF NAIROBI POSTHARVEST PROGRAM

The exhibition will showcase innovative technologies for storage and small-scale processing of perishable produce to reduce postharvest losses. The technologies to be showcased include innovative cold storage technologies that have been validated and/or improved by the University of Nairobi Postharvest Research team. These include off-grid cold storage technologies namely the zero-energy brick cooler, evaporative charcoal cooler and the PCM-based refrigerated box. The Coolbot cold room which is an on-grid but low-cost alternative to conventional cold rooms will also be showcased. Small-scale processing technologies to be showcased include the Solar Tunnel Dryer and the Dehytray®. Some of the dry and wet processed products developed team including mango chips, mango rolls (leathers), juices/nectars, wine, jams, chutney, mango-enriched yoghurt among others will also be showcased.

Research for development activities conducted by the University of Nairobi Postharvest Team have been supported by various funding partners (past and present). They include the Rockefeller Foundation, National Research Fund -Kenya, UK Research and Innovation (UKRI), Foundation for Food and Agriculture Research (FFAR) among others. The funding from these organizations have enabled the University of Nairobi Postharvest Research team to take research outputs to the users through various capacity building initiatives - 'lab to land'. Outreach and capacity building initiatives for various food supply chain practitioners have been supported by programs such as Strengthening African Processors (SAP) in partnership with Purdue University; Consortium for Innovations in Postharvest Loss and Food Waste Reduction in partnership with Iowa State University; Capacity building in Food Security for Africa (CaBFoodS-Africa) in partnership with University of Pretoria; Solar Powered Cold Food Chains for Food Waste Reduction and Value Addition (SolCOOL) in partnership with Brunel University and PCM-Ltd; UK; Eco-friendly Cooling Solutions in partnership with the World Food Program (WFP - Kenya) among others.





BUHLER GROUP PROFILE

Bühler Group is a Swiss multinational plant equipment manufacturer based in Uzwil, Switzerland. Bühler manufactures equipment and related services for processing foods and manufacturing advanced materials. Bühler is a market leader with a strong presence in local markets. The group has 14 sales offices in the Middle East and Africa region as well as 15 service stations and 525 employees. We are close to our customers. With 74 countries, the Region MEA is very diverse in terms of population, culture and ethnicity as well GDP representing 1/5 of the world population with approx. 1.65 billion people (approx. 1.15mio Africa). The African Milling School is based in Nairobi, Kenya and offers comprehensive and intensive training in the feed milling industry with a focus on theoretical and practical training. The AMS trains operational milling staff and shares milling knowledge and standards to millers in the Middle East & Africa region. Up to 5% of the Group turnover is invested into research and development



SASAKAWA AFRICA ASSOCIATION PROFILE

The Sasakawa Africa Association (SAA) was founded in 1986 in Geneva as a non-governmental organization (NGO) by Mr Ryoichi Sasakawa, Founder of The Nippon Foundation, as it is known today; Dr Norman E Borlaug, Nobel Peace Prize Laureate; and President Jimmy Carter, former President of the United States of America. SAA aims to sustainably increase Africa's smallholder farmers' food and nutrition security as well as their income earning potential, while creating employment opportunities for youths to ultimately raise rural living standards. For over 35 years, SAA has worked in 16 countries across the continent. Currently, SAA operates, and has country offices in, Ethiopia, Nigeria, Mali and Uganda, which are known as focus countries, with a Human Resource Development (HRD)/ Sasakawa Africa Fund for Extension Education (SAFE) also operating in seven additional countries. Funding for SAA comes principally from The Nippon Foundation, led by Chairman Mr Yohei Sasakawa. SAA realizes that the interventions against hunger and poverty is not yet won, but that it can contribute to greater impacts by improving the effectiveness and adoption of Agriculture Technologies and practices.

