



PEF President’s Message

We had PEF Annual Board Meeting in Davis, USA and took decisions on future activities of PEF and possibilities to continue the activities from India. It is good to see that the world has now recognised that postharvest losses are to be addressed and in the last couple of years, there has been a lot of discussion on sustainable solutions for cooling and reducing postharvest losses. Several programs such as ACES, SEforALL and international organizations like the World Bank and IIR are emphasizing investing in innovations like solar-powered cold storage. Companies like the Shell Foundation are coming forward to support innovations to sustainably reduce losses. Hope we come up with a good number of innovative sustainable solutions soon.



Dr. Vijay Yadav Tokala
President
 vijayyadav.t@postharvest.org

\$50,000 Post-Harvest Loss Innovation Prize



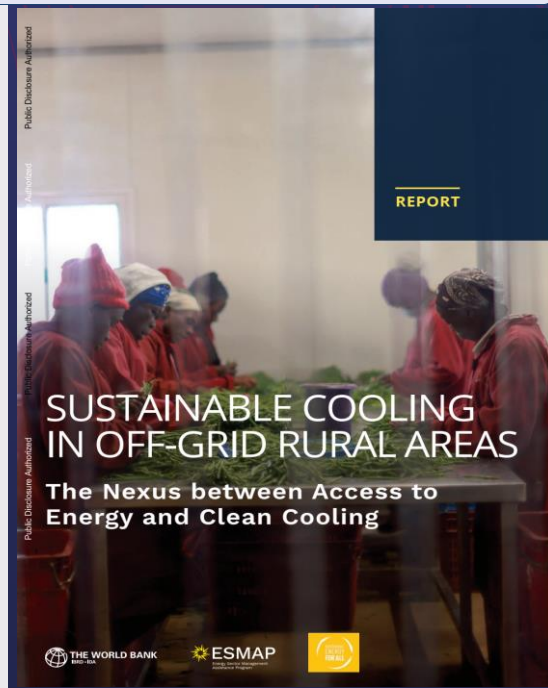
Shell Foundation and the UK’s Foreign, Commonwealth and Development Office are collaborating to boost farmer incomes by minimizing post-harvest losses in South Asia and Sub-Saharan Africa. ‘The Post Harvest Loss Innovation Prize’ is looking for creative solutions that can effectively decrease postharvest losses for smallholder farmers in developing regions. Finalists gain \$50,000, access to a network of experienced industry leaders and receive media exposure [[Website](#)]



Sustainable Cooling In Off-grid Rural Areas

A new report by Sustainable Energy for All (SEforALL) and the World Bank, states that expanding access to off-grid cooling is a collective endeavour that necessitates an innovative and multifaceted approach, including:

- Promoting simple, low-tech solutions like shading, ventilation, and cool roofs to enhance awareness and education
- Supporting existing markets to make off-grid cooling solutions accessible and affordable
- Demonstrating new technologies, including larger appliances like off-grid refrigerators and freezers, by subsidizing pilot projects and helping businesses scale production.
- Investing in innovations like solar-powered cold storage for farmers and supporting research and development to make off-grid solutions affordable and accessible. [[Download](#)]



Sustainable Approaches to Food Loss and Waste Reduction in Smallholder Horticulture: from Proof of Concept to Scale



SUBMISSION OPEN

Sustainable Approaches to Food Loss and Waste Reduction in Smallholder Horticulture: from Proof of Concept to Scale

Jane Lukhachi Ambuko · GLORIA ESSILFIE · Vijay Yadav Tokala · Erin McGuire · Peninah Yumbya · Md Golam Ferdous Chowdhury

The publication will feature interventions that have successfully transitioned from the proof-of-concept stage to practical application to tackle FLW issues, with the key factors contributing to their success. For interventions that have not advanced past the proof-of-concept phase, this publication aims to investigate the barriers that have impeded scaling-up efforts and suggest strategies to overcome them. Deadline for manuscript submission - **31 July 2024.**

Frontiers in Horticulture - [[Submit your manuscript](#)]



Congratulations Albert Fosso..!!

Albert Fosso (PEF graduate) has been appointed to work with FAO to develop strategies to reduce postharvest losses in the Comoros Islands. He has earlier conducted studies in Comoros Islands to identify main causes for losses.



Africa Centre of Excellence for Sustainable Cooling and Cold-chain (ACES)



REPORT – MARCH 2024



The Africa Centre of Excellence for Sustainable Cooling and Cold-Chain (ACES) was established in 2020 by the Governments of the UK and Rwanda, the Centre for Sustainable Cooling, the United Nations Environment Programme’s United for Efficiency initiative and the University of Rwanda. UK academic partners include the University of Birmingham, London South Bank University, Centre for Sustainable Road Freight and Cranfield University. The progress report of ACES program was published in March 2024 with details of different programs and local partnerships

since its inception. **PEF and GCCF** are supporting the cold chain and postharvest management capacity-building programs for ACES in Kenya and Rwanda.



ACES Trainees of foundational courses in Rwanda and Kenya

PEF Website update!



The PEF website is updated and there are many new hotlinks to share or save, and new documents to explore.

- [Free pdf Book: 100 under \\$100: Tools for reducing postharvest losses.](#)
- [PEF e-learning programs and free training manual \(3rd edition\)](#)

Many of LK's articles, training manuals and postharvest publications can be found on the UC Davis postharvest centre server. If you have any queries regarding our documents and manuals, contact us - vijayadav.t@postharvest.org (or) kitinoja@postharvest.org



Is a walk-in cold room (WICR) a good investment for a produce business?

Considerations in the Go/No-go decision will vary by situation and many possible issues are identified in the chapters of our WICR guide. But for a starting point and inspiration, pages 71-72 of **'Walk-In Cold Rooms, a Practitioner's Technical Guide'** are checklists to review to guide decisions for your operations or those of your clients.

Webinar series on WICRs by IIR

Webinar #1: Mastering Design and Operations.

Webinar #2: How much cooling is enough cooling?

WALK-IN COLD ROOMS, A PRACTITIONER'S TECHNICAL GUIDE

Design and Operation of Walk-In Cold Rooms for Precooling and Storage of Fresh Produce in Hot Climates, in Off-Grid and Unreliable Grid Situations

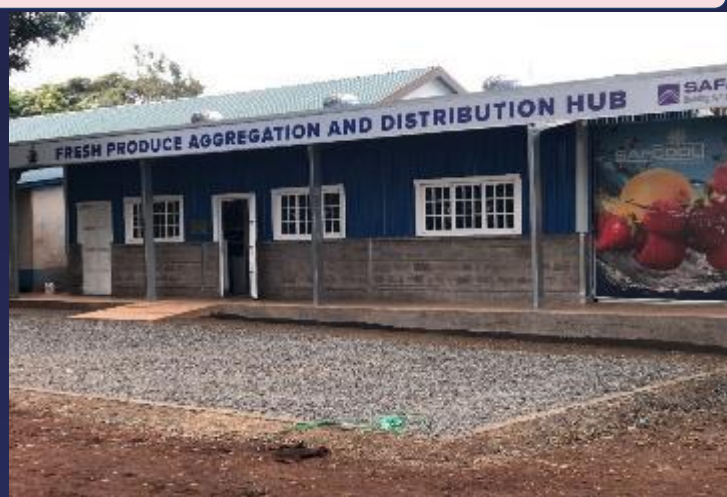


DECEMBER 2023



EFFICIENCY FOR ACCESS

Academia-Industry Partnership - Kenya



Prof. Jane Ambuko at Fresh Produce Aggregation and Distribution Hub in Nairobi, Kenya

On 9th May 2024, the Fresh Produce Aggregation and Distribution Hub was commissioned in Kenya as part of the Nairobi Innovation Week 2024 activities. The hub was designed and built through a partnership between the **University of Nairobi (UoN)** and **Mabati Rolling Mills (MRM)**.

The project titled 'Enhancing Productivity, Post-Harvest Management and Market Access of African Indigenous Vegetables in Kenya' is funded by **USAID's Feed the Future Innovation Lab for Horticulture**, which is hosted by the University of California, Davis, USA.

The new hub is equipped with simple facilities for postharvest handling, minimal processing and cold storage of fresh produce to preserve quality and extend their marketing period. The Fresh Produce Hub seeks to link smallholder horticultural farmers to the urban market while making the horticultural produce conveniently available to consumers in Nairobi.



Value Chain Assessments in Assam and West Bengal, India



Solar powered cold rooms in Assam, India

Vijay Yadav and Lisa Kitinoja worked with **Global Cold Chain Foundation (GCCF)** on value chain assessments during April 2024, followed by writing packhouse facilities and cold storage manuals for a World Bank Group program in the states of Assam and West Bengal, India. A workshop agenda was prepared for training value chain actors on

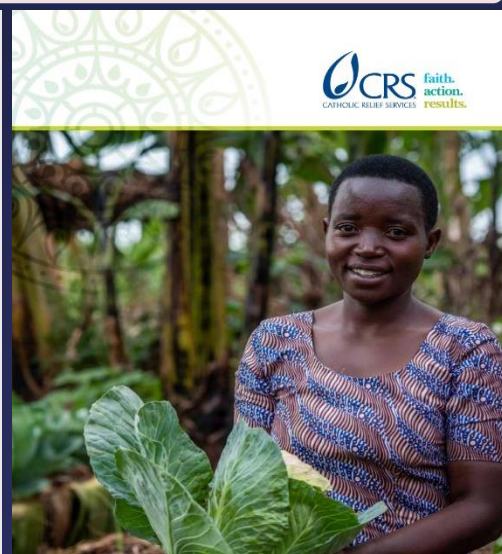
improved postharvest handling practices, including smallholder farmers, packinghouse managers, fresh produce and processed food products handlers, cold storage operators and domestic marketers for fruits, vegetables and spices.

Garden Resource Guide

The **Garden Resource Guide**, Project Design Guide, Program Manager's Guide, lesson plans, and job aids are based on the knowledge and expertise of field workers at **Catholic Relief Services** and other organizations. These resources benefit from the insights and experiences of professionals in various fields such as agriculture, nutrition, gender, water resources, marketing, postharvest handling, behaviour change, and monitoring and evaluation.

Lisa Kitinoja has authored the chapter on postharvest handling of horticulture crops.

[\[Download the Garden Resource Guide\]](#)



Garden Resource Guide

SUPPORTING GARDEN INTERVENTION DESIGN AND IMPLEMENTATION

Post Food Losses in Agrifood Systems: What We Know



Annual Review of Resource Economics
Food Losses in Agrifood Systems: What We Know

Luciana Delgado,¹ Monica Schuster,² and Maximo Torero³

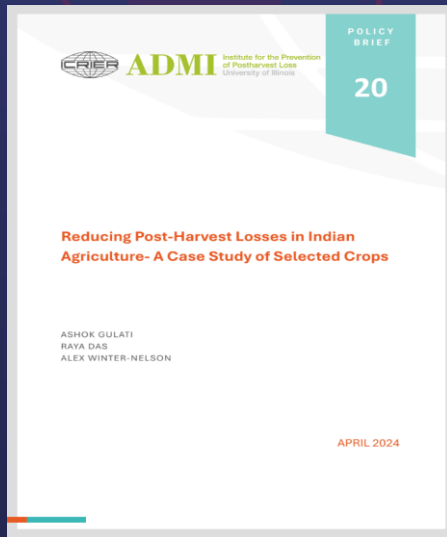
¹International Food Policy Research Institute, Washington, DC, USA
²Division of Bioeconomics, Department of Earth and Environmental Sciences, KU Leuven, Leuven, Belgium

³Food and Agriculture Organization of the United Nations, Rome, Italy; email: Maximo.Torero@fao.org

The review article examines the **metrics, reasons, and factors contributing to food loss**, along with the **strategies** aimed at mitigating it. The analysis highlights that food loss is often viewed independently, despite being both a contributor to and a consequence of the workings of agrifood systems.



Reducing Post-Harvest Losses in Indian Agriculture - A Case Study of Selected Crops



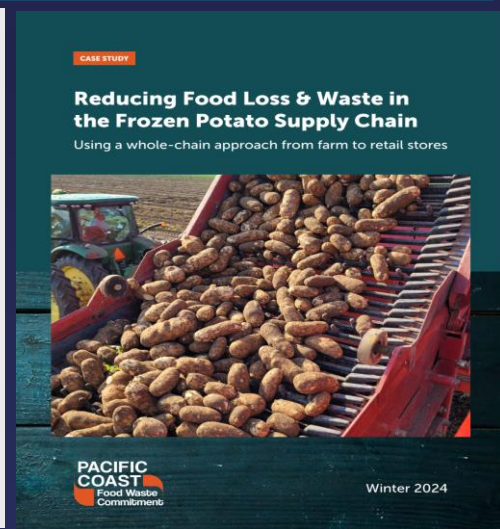
India loses approximately ₹ 1.53 trillion (US\$ 18.5 billion) worth of food annually due to post-harvest losses, highlighting the urgency of effective solutions. The latest policy brief describes minimizing post-harvest losses (PHL) is a more cost-effective and environmentally friendly approach to preserving nature's essential resources such as soil, water, air, and biodiversity, rather than focusing solely on increased production which often leads to greater waste. It also discusses strategies to tackle this issue and emphasizes the importance of technological change in grain management. [\[Download the Report\]](#)

Reducing Food Loss & Waste in the Frozen Potato Supply Chain

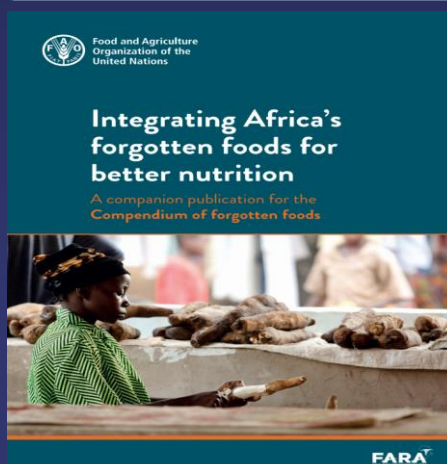
The Pacific Coast Food Waste Commitment (PCFWC) conducted a research study on food loss and waste (FLW) within the frozen potato supply chain to pinpoint the areas of concern and potential strategies for retaining more usable products within the human food cycle.

Multiple companies collaborated in the study to cover the entire supply chain, ranging from farms to processing facilities, distribution centers, and retail outlets.

[\[Download the Report\]](#)



Integrating Africa's forgotten foods for better nutrition



On a worldwide scale, several endeavors are being made to reintroduce traditional and forgotten foods into the mainstream food market as a crucial element of the revitalized agricultural and food systems. *Integrating Africa's forgotten foods for better nutrition - A companion publication for the Compendium of forgotten foods* contains a comprehensive listing, nutritional content and pictorial presentation of 100 forgotten foods in Africa. [\[Download the Report\]](#)



Improved cold chain could halve food waste



Improved refrigeration could save nearly half of the 1.3 billion tons of food wasted each year globally, a new report insists. The new study by the University of Michigan finds that nearly half of the food waste, about 620 million tonnes, could be eliminated by fully refrigerated food supply chains worldwide. [\[Read full article of Cooling Post\]](#)

No Food Left Behind

World Wildlife Fund is pioneering the development of a new simplified global Farm Loss Tool with WRAP-UK and Anthesis for farmers, ranchers, and growers of all sizes and food commodity types to easily measure and report their on-farm losses.

[\[Read the recent publications of WWF\]](#)



Vijay visit to UC Davis, USA and Nairobi, Kenya



Barbara, Diane, Lisa and Vijay at UC Davis



Demonstrations of small-scale solar driers at UC Postharvest Centre



Vijay, Florence and Samuel at Nairobi, Kenya

PEF Annual Board Meeting -2024 was held in Davis, USA with **Lisa Kitinoja, Diane Barrett and Vijay Yadav**. Following that, they visited the UC Postharvest Research and Extension Center along with **Barbara Blanco-Ulate**, co-director of UC Postharvest Research and Extension Center. They have also visited the small scale postharvest demonstration site of along with **Archie Jarman**, Associate Director, Feed the Future Innovation Lab for Horticulture.

Vijay then flew to Nairobi, Kenya to meet **Florence Kiburi and Samuel Njuguna**, Jomo Kenyatta University of Agriculture and Technology. He has handed over three bags full of postharvest tools which are to be used for upcoming PEF Leadership Program meet in Nairobi.



Postharvest Management of Horticulture Produce



Ethylene

- Plant hormone with both **beneficial and detrimental** effects on postharvest quality
- Released by produce as a **stress-response** and also **widely present** in environment



Ethylene

- Reduces**- Fruit firmness, Storage life,
- Increases**- Ripening, Respiration rate, Senescence

C₂H₄ Management - Gentle handling; Sorting damaged and rotten fruit; Ethylene scrubbers; biosynthesis inhibitors; ethylene action antagonists (1-MCP); low temperature/controlled atmosphere storage to slow down physiological activity; Modified Atmospheric Packing (MAP) etc.

Preharvest factors

Environmental factors:
Extreme temperatures affect nutritional quality and appearance

Untimely rains influence composition of produce and susceptibility to mechanical damage

Nutrient management:
Deficit or too much fertilizer degrade quality and storability

Cultivation practices:
Irrigation management (fruit cracking, low SSC, delayed maturity), **weed control, training and pruning**

- Cultivar and Rootstock genotype
- Growth regulators

Harvesting

Harvest maturity:
Under-ripe do not develop their full flavor or varietal characteristics
Over mature - low postharvest life, too fibrous

Harvest practice:

- Proper tools and gentle handling
- Coolest part of the day
- Protect from direct sun exposure

Precooling

Removal of **field heat** after harvest and bringing down **up to 87%** of initial temperatures before transferring into storage

Types: Hydrocooling, Vacuum cooling, Forced Air cooling, Hydro air cooling, Contact icing

Selection of method depends upon - crop type, quantities of the crop, initial temperatures, cost: benefits and expected increase in income

Packhouse operations

Dumping from harvest bins with minimum bruising and abrasions

- Padded, sloping ramps or moving conveyor belts**
- Wet dumping** in chlorinated (100-150 ppm) water

Cleaning type depends upon commodity

- Mango, Banana** - washing to remove latex
- Kiwifruit, Avocado** - dry brushing
- Chilli, Green peas** - No wash

Sorting injured, decayed, over ripe, diseased, and defective produce before cooling or additional handling

Waxing replace natural waxes lost during postharvest handling, reduce water loss and give shiny appearance

Grading based on size, weight, color, shape and maturity, with the market specifications

Curing of root and bulb crops in a warm conditions - heal harvest wounds and reduce water loss

Packaging should **enclose** commodity and offer **easiness** in transporting

- Protect** produce from **mechanical, biotic** (pest and diseases) and **abiotic damages** (heat, wind etc.) and positively regulate **physiological processes**
- Withstand **stacking** and compatible to different **storage environments**
- Marketing** - Display, labels, information

Storage

- Produce meant for storage **should be of high quality**
- Storage conditions should **slow down** the **metabolic processes** and **respiration** of the produce without causing any undesirable quality changes
- Lowest safe storage temperatures** and **relative humidity** conditions for long term cold storage **differ for each type** of fresh produce
- For storage to be economically viable, the **extended holding life** should be efficiently used to explore better **marketing chances**
- Incompatible mixed loads** cause more damage than good
E.g.: Evaporative cooling, Refrigerated cold store, Controlled Atmospheric (CA)

Transportation

- Goal of transportation is to move perishable products with **minimum loss of quality**
- Temperature management** is critical during long distance transport
- Load **pre-cooled produce** into long distance transport
- Loads must be piled to allow for **sufficient air circulation** and **braced** to prevent the containers from falling
- Ensure **proper air suspension systems** of vehicle to reduce vibration damages

Retail and Consumer

Improper product display only considering consumer expectations rather than physiology of produce is one of the major driver for losses at retail

Innovative packaging - reusable, attractive and retain produce quality

Dynamic pricing - reduced prices with lower quality

- Consumer awareness** on produce quality vs cosmetic standards
- Avoid confusing labels

Ideal storage conditions at household also vary based on the types of produce

Quality and Food Safety

Quality - degree of excellence or superiority of the produce

Parameters - visual, feel, flavor, nutritional value, and safety

Food Safety - practices for keeping fresh produce clean and safe to eat

- Good Agricultural Practices (GAP);
- Sanitation Procedures;
- Good Manufacturing Practices (GMP);
- Hazard Analysis Critical Control Points (HACCP)

For scaling-up, it is crucial to **compare the relative costs and expected benefits** of improved practice or technology with the current practice.



The Postharvest Education Foundation

Website: www.postharvest.org | E-mail: postharvest@postharvest.org

The Postharvest Education Foundation (PEF) has a mission to provide innovative programs that motivate and empower people to reduce global food losses, maintain quality, market value, nutritional value and food safety.

Our Strategy:

- Conducting a variety of postharvest e-learning programs for young professionals who work with small scale farmers in developing countries.
- Providing free access to postharvest training materials for those who are involved in extension work and training of farmers, produce handlers, small scale food processors and marketers.
- Supplying postharvest tools and basic equipment for use in applied research and for improving practical field operations.
- Organizing postharvest workshops for e-learners who successfully complete their online programs.
- Long term mentoring for participants in e-learning programs via social networking websites
- Conducting short courses, study tours and workshops
- Providing advice and guidance for establishing local postharvest training centers

PEF's 'Global Postharvest E-learning Program' is FREE to all

NOW AVAILABLE IN ESPANOL AND FRANCAIS

Check the website for further details :

http://postharvest.org/postharvest_elearning_program1.aspx.

Contact Us:

The Postharvest Education Foundation

PO Box 38, La Pine, Oregon 97739 USA

Office telephone: 1 (916) 708 7218

Email: postharvest@postharvest.org

Website: www.postharvest.org

Connect with us on:



Email us at newsletter@postharvest.org to subscribe to the PEF newsletter