COMMUNITY OF PRACTICE ON FOOD LOSS AND WASTE (FLAW)

Flaw in the FLAW

Session Topic: "Circular Economy Approaches to Tackle Food Waste: Strategies, Systems, and Solutions"

Guest Speaker:

PROF. BINEESHA PAYATTATI

EXECUTIVE DIRECTOR
INTERNATIONAL INSTITUTE OF WASTE MANAGEMENT (IIWM) IN INDIA.

Panelists:

MS. MIYUKI IIYAMA

DIRECTOR
RESEARCH STRATEGY OFFICE,
JAPAN INTERNATIONAL RESEARCH CENTER FOR AGRICULTURAL SCIENCES (JIRCAS)

DR. KAVYA DASHORA

ASSOCIATE PROFESSOR
THE INDIAN INSTITUTE OF TECHNOLOGY (IIT) DELHI

Moderator:

DR. RAVI KHETARPAL

EXECUTIVE DIRECTOR
APAARI ASIA-PACIFIC ASSOCIATION OF AGRICULTURAL RESEARCH INSTITUTIONS

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Proceedings of the APAARI Community of Practice Session on Food Loss and Waste in "Circular Economy Approaches to Tackle Food Waste: Strategies, Systems, and Solutions"

Date: 19th December 2025

Time: 2:00 – 3:00 hrs (GMT+7)

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Executive Summary

The fourth session of APAARI's Community of Practice (CoP) on Food Loss and Waste (FLAW) convened stakeholders across the Asia–Pacific region to spotlight **practical technology options** and **social innovations** that reduce food waste and strengthen food security, climate action, and livelihoods.

The webinar on **"Circular Economy Approaches to Tackle Food Loss and Waste: Strategies, Systems, and Solutions"** brought together leading experts, researchers, policymakers, and practitioners from the Asia-Pacific region to discuss innovative, systemic, and scalable approaches for reducing food loss and waste (FLW) across agri-food value chains. The event provided a multidisciplinary platform to explore technical, socioeconomic, and policy-driven solutions aligned with circular economy principles.

The keynote address highlighted the urgency of addressing FLW as a critical challenge impacting food security, environmental sustainability, and climate resilience. Emphasis was placed on adopting circular economy frameworks that move beyond traditional linear models toward prevention, recovery, redistribution, and value addition. The keynote also underscored the importance of integrated strategies spanning production, processing, distribution, and consumption stages.

Panel discussions offered diverse perspectives on circular economy implementation in agri-food systems. Experts from international research institutions, development organizations, and academia shared practical experiences and innovative solutions, including sustainable waste management systems, valorization of agricultural residues, circular learning tools, and sustainable packaging alternatives. Case examples such as the recycling of agricultural by-products into value-added products, the development of interactive circular economy tools, and the promotion of

sustainable supply chain interventions demonstrated the potential of technology and innovation in transforming agri-food systems.

A key outcome of the discussions was the recognition that effective FLW reduction requires coordinated multi-level interventions involving farmers, households, communities, industries, and policymakers. The role of public–private partnerships, international collaboration, and MSME engagement was highlighted as essential for scaling circular economy practices. Participants also emphasized the need for capacity building, knowledge sharing, and awareness generation to mainstream circular approaches and foster behavioral change.

The proceedings further identified the importance of enabling systems, including supportive policies, institutional frameworks, financing mechanisms, and digital platforms, to accelerate the transition toward circular agri-food systems. Sustainable packaging, by-product valorization, food recovery networks, and circular innovation ecosystems were recognized as critical pillars for achieving long-term impact.

Overall, the webinar reinforced the need for a holistic, value chain-based approach to tackling food loss and waste through circular economy principles. The discussions concluded with a strong call for collective action, evidence-based policymaking, and continuous innovation to build resilient, resource-efficient, and sustainable agri-food systems in the Asia-Pacific region. The insights and recommendations generated during the webinar provide a strategic roadmap for stakeholders seeking to operationalize circular economy approaches and contribute to sustainable development goals.

Introduction

The Asia Pacific Association of Agricultural Research Institutions (APAARI), through its Community of Practice (CoP) on Food Loss and Waste, convened a virtual session addressing the topic:

"Circular Economy Approaches to Tackle Food Waste: Strategies, Systems, and Solutions"

The session focused on Food loss and waste (FLW) remains one of the most critical challenges facing agri-food systems globally, particularly in the Asia-Pacific region. The issue has far-reaching implications for food security, nutrition, livelihoods, climate change, biodiversity loss, and sustainable development. Recognizing the urgency of this challenge, the **Asia-Pacific Association of Agricultural Research Institutions (APAARI)**, in collaboration with the **Asia-Pacific Community of Practice on Food Loss and Waste (FLOW–CoP)**, initiated a structured

series of knowledge-sharing sessions to promote dialogue, innovation, and collective regional action

1. Background and Welcome (2:00 PM – 2:05 PM)

Welcome Remarks: Dipika Trivedi (Project Associate, APAARI)

Welcomed participants, colleagues, and distinguished guests on behalf of APAARI. Contextualized the CoP series focus on **Food Loss and Waste (FLW)** in the Asia–Pacific region, aiming to **share knowledge**, **discuss strategies**, **circular economy,** and **build cooperation**.

Welcoming remarks, Ms. Dipika Trivedi reflected on the progression of the FLOW–CoP sessions and highlighted how the earlier discussions had laid a strong foundation for evidence-based dialogue, innovation, and collective action. She emphasized that the current session aimed to deepen the discussion by focusing on circular economy principles as a pathway to reducing food loss and waste and strengthening sustainable food systems.

- **Reflections on prior sessions:**
  - **Session 1:** "**Silent Famine—Asia-Pacific's Hidden Emergency of Food Loss and Waste**," with a keynote by **Dr. Ravi Khetarpal**, highlighting the gravity of FLW for **food security, nutrition, environment, and livelihoods**.
  - **Session 2:** "**New Strategies on Handling Waste in Animal Agricultural Systems for Controlling GHG Emissions**," featuring **Prof. Pramod Pandey (UC Davis)** and emphasizing **policy frameworks** and **practical models** for **GHG mitigation**.
  - **Session 3: "Management of Food Waste: Technological Options" Professor A.K. Dikshit (IIT Bombay)** explored technological and **scalable solutions for food waste management, emphasizing innovation-led pathways to strengthen sustainable food systems** across the Asia-Pacific region.

Opening Remarks

Chair/Moderator: *Dr. Ravi Khetarpal (Executive Director, APAARI)*

Dr. Ravi Khetarpal (Executive Director, APAARI) provided a background on APAARI's ongoing Communities of Practice, noting successful initiatives in biopesticides and public-private partnerships. He highlighted staggering statistics: saving just 1% of global crop losses could feed 25 million people, while 5-7% reductions could potentially address hunger for 1.5 billion. The importance of viewing food loss and waste not merely as a waste

management problem, but as a system-level failure across the agri-food value chain.Dr. Khetarpal Reiterated CoP's purpose beyond webinars: drive **partnerships, knowledge exchange, and collaboration** with tangible follow-up with unique contribution of the FLAW-CoP led by **Ms.Dipika Trivedi.**

Dr. Khetarpal emphasized that:

- Food loss and waste contributes significantly to greenhouse gas emissions and climate change
- Circular economy approaches offer opportunities to transform waste into value
- Regional cooperation, research networks, and policy alignment are essential to drive large-scale impact
- He also underscored the need to learn from natural ecosystems, where waste does not exist and materials continuously circulate in closed loops.

- **Introduced speakers:**
  - **Keynote: Prof. Bineesha Payattati**, Executive Director, International Institute of Waste Management (IIWM), Bengaluru, India for "**Circular Economy Approaches to Tackle Food Loss and Waste: Strategies, Systems, and Solutions."** with extensive international experience she's a leading expert in waste management, circular economy, and sustainability, with a rich experience in research, policy, advisory, capacity building, and international collaboration. her work strongly focuses on sustainable waste systems, resource efficiency, and circular economy. driven solutions that contribute to environmental protection and climate resilience.

    Panelist:

  - **Panelist 1st: Ms. Miyuki Iiyama**

    Director of the Research Strategy Office at the Japan International Research Center for Agricultural Sciences (JIRCAS)

    Question: "Japan's strategies for promoting research and innovations for sustainable food systems: cases of bioeconomy technologies"

  - **Panelist 2nd: Dr. Kavya Dashora**

    Associate Professor at the Indian Institute of Technology (IIT) Delhi

  - **Panelist 3rd : Ms. Sandunika**

Technical Project Manager at FAO (Food and Agriculture Organization) in Sri lanka

2. Technical Session of the CoP (2:05 PM – 2:45 PM)

Moderator: Dr. Ravi Khetarpal (Executive Director, APAARI)

Speakers: Prof. Bineesha Payattati,

Executive Director, International Institute of Waste Management (IIWM), India

"Circular Economy Approaches to Tackle Food Waste: Strategies, Systems, and Solutions"

Key Points:

1. Technology vs. Nature: Rethinking Circular Economy

The keynote challenged the common perception that circular economy solutions are primarily technology-driven. While technology often dominates discussions, food loss and waste (FLW) require a fundamentally different approach. By examining **forest ecosystems**, the speaker highlighted that **nature operates without waste**.

In forests, food is produced, transported, processed, stored, distributed, and consumed—yet **waste does not accumulate or become a problem**. Losses, if any, are minimal and naturally reintegrated into the ecosystem.

Key insight: Nature functions through **closed-loop, circular systems**, unlike human food systems where losses occur at every stage.

2. Food Loss and Waste: A Human-System Failure

In contrast to natural ecosystems, the **human food value chain** from production to disposal experiences losses at every stage. These losses:

- Create **significant environmental impacts**
- Strain natural resources (land, water, energy)
- Generate **toxic and long-lasting waste**, particularly packaging and chemical residues

Globally, **35–40% of food is wasted**, across both developing and developed countries, indicating that FLW is not merely a development issue, but a **systemic failure**.

Key insight: Food waste is not a disposal problem it is a **design and system problem**.

3. Inequality, Affluence, and Food Waste

The keynote highlighted stark global disparities:

- **China** leads in total food waste due to population and affluence

- **The United States** ranks highest in **per capita food waste**
- Higher affluence strongly correlates with higher waste generation

Critically:

- **Two-thirds of food loss occurs pre-consumer** (from farm to distribution)
- **25% of global freshwater use** goes into producing food that is never eaten
- **3.5 billion people** face food insecurity while edible food is wasted

Key insight: Food waste is both an **ethical failure and a resource crime**.

4. Climate Change Linkages

Food loss and waste significantly contribute to **greenhouse gas (GHG) emissions**, through:

- Agricultural production
- Land-use change
- Decomposing organic waste in landfills

China and the United States together account for a major share of **GHG emissions linked to food systems**, making FLW a critical **climate action priority**.

Key insight: Reducing food waste is one of the **fastest pathways to climate mitigation**.

5. Learning from Nature: Circular and Closed-Loop Systems

Nature maintains balance through **biotic and abiotic interactions**, ensuring that materials continuously cycle back into the system. These principles can be **replicated in human systems**, including cities and villages.

The keynote emphasized the **waste hierarchy (inverted pyramid)**:

1. **Refuse and rethink**
2. **Reduce**
3. **Reuse**
4. **Recycle**
5. **Recover (last resort)**

Key insight: Recycling and recovery alone are insufficient and energy-intensive if reduction strategies are ignored. Circular economy begins with **decision-making and lifestyle change**, not end-of-pipe solutions.

6. Linear vs. Circular Food Systems

The current **linear model** *take, make, consume, dispose* results in:

- Hidden health costs

- Environmental degradation
- Economic losses

Key insight: In contrast, a **circular economy model** reintegrates nutrients and materials back into the system, mirroring natural cycles and reducing dependence on external resources. Circular economy restores **nutrient cycles**, not just waste management.

7. Cities, Food Systems, and Decentralization

With **65% of the global population living in urban areas**, cities must adopt circular food systems despite scale and logistical challenges. Proven strategies include:

- Localized and peri-urban food production (within ~20 km)
- Regenerative and organic farming
- Local processing and consumption
- Short supply chains to reduce energy and transport losses

Key insight: Local food systems are energy-efficient, resilient, and climate-smart.

8. Lifecycle Thinking and Lifecycle Assessment (LCA)

Managing waste only at the disposal stage often increases resource and energy use elsewhere. Instead, interventions must start **from production design**.Effective FLW reduction requires:

- **Lifecycle Thinking (LCT)** before interventions
- **Lifecycle Assessment (LCA)** for each commodity

Key insight: You cannot fix food waste without understanding the **entire lifecycle of food**.

9. Practical Circular Economy Strategies Across the Value Chain

Key interventions highlighted:

- Promote **fresh food consumption (≥80%)**
- Discourage ultra-processed, health-damaging foods
- Optimize inventory and distribution systems
- Reduce and redesign food packaging
- Implement **Extended Producer Responsibility (EPR)**
- Use decentralized, household- and institution-level technologies
- Impose **penalties for organic waste generation**

Technologies such as AI, tracking tools, and inventory software should be used to **prevent waste**, not merely manage it.

Key insight: Small, decentralized solutions are more effective than large, centralized technologies.

10. Treatment and Disposal: The Last Option

Biogas, biomethanation, and waste-to-energy should be **last-resort solutions**, especially for organic waste. Such technologies are best limited to **processing zones**, not entire cities.

Key insight: If upstream systems are well-designed, **very little waste reaches the disposal stage**.

Key Messages from the Keynote

- **Food loss and waste is misplaced value, not waste**
- Nature offers the best model for circular economy solutions
- FLW is a system failure, not a technological gap
- Prevention, reduction, and lifestyle change are more powerful than recovery
- Decentralized, local, and nature-inspired solutions are essential
- Circular economy is a **climate solution, a resource solution, and a resilience strategy**

3. Panel Discussion (2:45 PM – 3:05 PM)

1.Panelist: Dr. Miyuki Iiyama Japan International Research Center for Agricultural Sciences (JIRCAS), Japan

Topic: "Japan's strategies for promoting research and innovations for sustainable food systems: cases of bioeconomy technologies"

Dr. Miyuki Iiyama provided an overview of **JIRCAS** and its role as Japan's national institute dedicated to international agricultural research institute of **Japan and a member of APAARI.** JIRCAS is the only Japanese national research institute exclusively dedicated to international agricultural research, covering agriculture, forestry, and fisheries. Its core mandate is to promote international collaboration, particularly with developing countries in Asia and Africa, by developing technologies suited to local agro-ecological and socio-economic contexts on valorization of agricultural residues, particularly in the Asia-Pacific region.

- **Focus on Agricultural and Industrial Waste**

  Building on the discussion of food loss and waste, the panelist highlighted that **agricultural and agro-industrial waste** is a critical but often under-addressed component of the broader food system.A key example presented was the **oil palm sector in Southeast Asia**, particularly in **Malaysia and Indonesia**, where large quantities of **oil palm trunk**

waste are generated after tree harvesting. These residues are often left in plantations, leading to:

- Methane emissions during decomposition
- Increased risk of pests and diseases
- Soil degradation
- Indirect pressure on forests and land-use change

- **Innovation for Circular Economy Solutions**

  Ms. Iiyama shared that her research team at JIRCAS has been developing **innovative recycling technologies** to convert unused oil palm biomass into **value-added products**, including:

  - Biomass pellets
  - Bioplastics
  - Renewable energy sources

  These technologies are being developed through **collaboration with private companies and research institutions**, demonstrating the importance of **multi-stakeholder partnerships** in advancing circular economy solutions.

- **Contribution to Sustainable Food Systems**

  Given that oil palm is a major raw material for edible oil and food processing while also serving non-food industries such as pharmaceuticals and detergents the panelist emphasized that **closing the loop in agricultural waste management** is essential for achieving sustainability across the entire food system.

  Key Message:

  Targeted technological innovations that transform agricultural residues into valuable resources can significantly reduce emissions, prevent environmental degradation, and strengthen **circular economy pathways** in agriculture especially in resource-intensive sectors like oil palm.

2. Panelist: Dr. Kavya Dashora Associate Professor, Indian Institute of Technology (IIT) Delhi, India

Dr. Kavya Dashora framed food loss and waste as a **triple planetary crisis**, contributing to climate change, biodiversity loss, and pollution which is brings a unique interdisciplinary perspective at the intersection of **Google technologies, artificial**

intelligence, data-driven systems, and sustainable development. Her work focuses on applying **AI-enabled and digital solutions** to agriculture, smart resource management, and inclusive digital transformation, supporting **climate resilience and sustainability pathways**.

- **Food Loss and Waste as a Triple Planetary Crisis**
  - Climate change
  - Biodiversity loss
  - Environmental pollution

  She emphasized that FLW is the **third-largest contributor to global greenhouse gas emissions**, particularly through landfill methane emissions. Importantly, she stressed that FLW is **not merely a downstream engineering issue**, but fundamentally a **behavioral and cultural problem**, rooted in consumption habits such as overbuying, improper storage, and excessive portion sizes.
- **Critical Gap in Climate Finance**

  A key concern highlighted was the **severe mismatch between impact and investment**:
  - FLW accounts for approximately **30% of global emissions**
  - Yet receives only **4.3% of global climate finance**

  This disparity was identified as a **major policy red flag**, requiring urgent advocacy within global platforms such as **UN, FAO, and climate finance mechanisms**.
- **From Composting to Valorization**

  composting as the default solution, arguing that it should be a **last-resort option**. Instead, she advocated for **nutrient and resource valorization**, where maximum value is extracted before disposal.She illustrated this with examples from the **potato value chain**, where nutrient-rich wash water containing vitamins, minerals, and proteins is often lost, leading to **eutrophication and pollution**. Valorization of such side streams can:
  - Reduce chemical inputs
  - Prevent environmental degradation
  - Unlock economic value from waste streams
- **Embedding FLW in National Climate Commitments**

  FLW reduction targets into Nationally Determined Contributions (NDCs). She emphasized that NDCs are powerful policy instruments capable of:

- Driving national-level action
- Translating global commitments into citizen-level behavioral change
- Aligning food systems with climate goals

- **Role of Digital Technologies**

  She highlighted the transformative role of **AI, blockchain, biotechnology, and digital traceability systems** in FLW reduction. Drawing parallels with logistics tracking in e-commerce, she argued that **food systems should be equally traceable**, from production and storage to consumption and waste.

- **Measurable and Verifiable Frameworks**

  Dr. Dashora proposed developing **measurable, reportable, and verifiable (MRV) frameworks** for FLW, enabling:

  - Performance tracking
  - Accountability
  - Evidence-based policymaking

  Such frameworks would allow FLW interventions to move from theoretical concepts to monitorable and scalable solutions.

- **Shifting from Disposal to Recovery Economies**

  She concluded by emphasizing that FLW should be approached through the lens of **nutrient recovery and local food valorization**, enabling:

  - Low-cost, locally produced nutrient-rich food options
  - Reduced pressure on water, soil, and other natural resources
  - A transition from a **disposal-based economy to a rescue-and-recovery economy**

  Key Message:

  Food loss and waste is not just an environmental issue—it is a **systemic, behavioral, economic, and policy challenge**. With the right mix of technology, finance, policy integration, and cultural change, FLW can become a powerful lever for climate action and sustainable development.

3. **Panelist: Ms. Sandunika** Technical and Socioeconomic Innovation Specialist, FAO Sri Lanka Ms. Sandunika emphasized that **food loss and food waste remain among the most pressing challenges in agri-food systems**, critical dimension to the discussion on food

loss and waste (FLW), particularly at the intersection of **packaging, supply chains, and circular economy solutions** with direct implications for:

- Food security
- Natural resource efficiency
- Climate change mitigation
- Economic resilience

Addressing FLW requires a fundamental shift from **linear "take–make–dispose" models** toward **circular approaches** centered on prevention, recovery, redistribution, and value addition.

- **The CIRCULAR Project: Advancing Circular Agri-Food Systems**

She introduced the **CIRCULAR Project**, a flagship initiative implemented under the **EU Global Gateway Framework**, funded by the **European Union** and implemented in collaboration with **FAO, GIZ, and Expertise France**. The project targets persistent linear production and consumption models that drive inefficiencies across the agri-food sector in the Asia-Pacific region, including Sri Lanka.

The project's primary objectives include:

- Reducing food loss and food waste across value chains
- Promoting alternatives to **single-use plastics**
- Strengthening economic and environmental resilience

- **FAO's Integrated Technical and Socioeconomic Approach**

She highlighted FAO's role in delivering **integrated solutions** through:

- Scalable technologies and practices for **MSMEs** to improve supply chain efficiency
- **Food recovery and redistribution networks** to channel safe, surplus food to vulnerable populations
- **Valorization of food losses and by-products** into animal feed, biogas, compost, and higher-value applications
- Promotion of **sustainable packaging alternatives**
- Capacity development to improve **food and financial literacy**
- Strengthening **public–private partnerships** to embed circular practices across the food sector

- **Circular Economy Reference Tool: Enabling Action**

A key innovation presented was the **Circular Economy Reference Tool**, an interactive digital platform designed to support **circular learning and decision-making** in the agri-food sector. The tool bridges **technical innovation with investment pathways**, making circular economy concepts actionable for policymakers, entrepreneurs, and practitioners.

Key features include:

- Coverage of **52 agri-food value chains**
- Classification of technologies as **emerging, scaling, or established**
- Identification of both **short-term and long-term investment opportunities**
- Practical guidance on reducing food loss and valorizing by-products

- **Valorization Pathways Across Food Value Chains**

  She provided concrete examples of valorization opportunities The platform allows users to explore specific waste streams such as **paddy husk** and identify appropriate technologies and valorization pathways:

  - **Fish and seafood by-products** converted into fish meal, pet food, and organic fertilizers
  - **Crop residues, fruits, vegetables, and livestock by-products** repurposed into animal feed and other value-added products
  - Emphasis on **higher-value applications** before composting or bioenergy, which should remain last-resort options

- **Engagement and Collaboration**

  She concluded by inviting stakeholders to engage with the **CIRCULAR Project working group on circular economy**, encouraging collaboration, knowledge exchange, and expressions of interest from researchers, entrepreneurs, and institutions across the region.

Key Message:

Operationalizing circular economy principles through integrated policy, technology, packaging innovation, and value-chain-level tools is essential to reducing food loss and waste while strengthening sustainable and resilient agri-food systems.

4. **Open Discussion Q&A and Audience Reflections (3:05 PM-3:25 PM)**

The open discussion session provided valuable practical insights, cultural perspectives, and solution-oriented reflections on reducing food loss and waste (FLW) across households, communities, institutions, and agricultural systems.

1. **Household-Level Food Loss Reduction**

   In response to a question on minimizing food loss at the household level, **Ms. Bineesha Payattati** highlighted the importance of **tracking and awareness**. She emphasized the use of:

   - Digital applications (e.g., food tracking and waste monitoring apps)
   - Simple household tools such as spreadsheets or food diaries

   Recording food purchases, storage, and waste over time helps households understand consumption patterns, reduce unnecessary purchases, and lower carbon footprints. Behavioral nudges—such as visual feedback on waste quantities in institutional settings (e.g., student messes)—have proven effective in creating awareness and encouraging portion control.

   Key takeaway: Measurement and visibility of waste are critical drivers of behavioral change.

2. **Drivers of High Food Waste and Carbon Footprints**

   Addressing a question on why countries such as **China and the United States** have high food waste-related carbon footprints, Ms. Bineesha explained that **market-driven production models** focused on economic growth and consumerism often incentivize overproduction and overconsumption. This skewed system, particularly in food markets, leads to excessive waste generation and associated environmental impacts.

3. **Cultural and Social Dimensions of Food Waste (Dr. Manoj Kumar):**

   Dr. Manoj Kumar highlighted the **social and cultural drivers of food waste in India**, particularly in large social gatherings such as weddings, religious events, and ceremonies where buffet-style dining is common. He noted that traditional practices in rural areas still emphasize portion control and minimal waste, whereas buffet systems encourage excess.

   The discussion underscored the need for:

   - Cultural norms encouraging mindful food consumption
   - Structural changes in food service practices at large events

4. **Food Recovery and Redistribution at Events (Ms. Sandunika FAO Sri Lanka):**

Responding to this concern, Ms. Sandunika (FAO Sri Lanka) shared that FAO is actively developing guidelines for food recovery and redistribution from events such as weddings and large functions. These guidelines aim to ensure that safe, surplus food is redirected to vulnerable populations, reducing waste while improving food access.

5. **Frameworks for Food Loss and Waste Reduction (Dr. Kavya Dashora):**

   A question on the availability of a **tangible framework for FLW reduction** was addressed by **Dr. Kavya Dashora**, who indicated that a preliminary framework exists. She emphasized the need for further refinement through **global experience and policy alignment**, and proposed sharing initial framework elements through the webinar proceedings for broader consultation and development.

6. **Managing Agro-Waste at Field Level**

   A horticulturist raised concerns regarding **post-harvest agro-waste management**, particularly for crops like potato and tomato, where foliage cannot be used as animal feed due to toxicity.

   Dr. Kavya emphasized that **composting should be the last option**, advocating instead for **valorization pathways**, including:

   - Conversion into biofibers, biomulches, and biodegradable products
   - Nanotechnology-based fertilizers and materials
   - Pulping residues for paper and packaging
   - Nutrient extraction (e.g., proteins, vitamins, minerals) from co-streams

   She highlighted that such approaches can prevent practices like **stubble burning**, which contribute significantly to air pollution.

7. **Expanding Valorization Pathways**

   Ms. Bineesha further added that agro-residues containing alkaloids or toxins such as potato and brinjal peels can be repurposed for **non-food applications**, including:

   - Artificial leather
   - Tiles, mats, and construction materials

   These examples underscored the need for **creative, multi-pathway utilization** rather than single-solution approaches.

8. **Innovation, Resource Constraints, and Creativity**

The discussion acknowledged that **resource-constrained communities and laboratories** often generate the most innovative solutions. Creativity, local knowledge, and necessity-driven innovation were identified as powerful drivers for effective FLW management.

Closing Remarks (3:25 PM-3.30 PM)

Dr. Ravi Khetarpal (APAARI):

In his concluding reflections, Dr. Ravi emphasized that the session offered a wealth of insights and practical strategies to address food loss and waste across multiple levels—individual, household, community, commercial, and farming systems. He highlighted the importance of adopting a holistic approach that spans the entire agri-food value chain, from production to distribution.

Dr. Ravi underscored that while we are rich in knowledge and ideas, the real challenge lies in effectively applying this knowledge. He called upon participants to avoid the "wastage of knowledge" by actively translating learning into action and fostering a "knowledge circular economy," where ideas, innovations, and best practices are continuously shared, adapted, and implemented. He expressed sincere gratitude to all speakers for their valuable contributions, to participants for their thoughtful questions and engagement, and to all stakeholders who made the webinar meaningful and impactful. With these reflections, Dr. Ravi concluded the session and invited Ms. Dipika to deliver the closing remarks of the webinar.

Ms. Deepika Trivedi (APAARI):

Ms. Dipika Trivedi closed the session by thanking the speakers, panelists, and over 650 registered participants for their engagement. invited remaining questions via chat/email committed to sharing proceedings and presentation files; requested a group photo.

Outcomes & Recommendations

Agreed/Noted Outcomes

Based on the keynote address, panel discussions, and participant interactions, the following key outcomes were agreed and noted:

1. **Recognition of Food Loss and Waste (FLW) as a Systemic Challenge**
   Participants acknowledged that food loss and waste are critical challenges affecting food security, natural resources, economic sustainability, and climate resilience across the agri-food value chain.
2. **Need for Circular Economy Approaches**

There was a strong consensus on the importance of transitioning from linear "take–make–dispose" models to circular economy frameworks that emphasize prevention, recovery, redistribution, and value addition.

3. **Multi-Level Interventions Across the Value Chain**

   It was highlighted that effective FLW reduction requires coordinated actions at multiple levels:

   - Production and post-harvest stages
   - Supply chains and logistics
   - Processing and packaging
   - Distribution and consumption
   - Policy and governance frameworks

4. **Role of Innovation and Technology**

   Participants noted the importance of technical and socioeconomic innovations, including sustainable packaging, digital tools, and circular economy reference platforms, to identify scalable solutions and investment opportunities.

5. **Importance of Stakeholder Collaboration**

   The session emphasized the need for stronger public–private partnerships and multi-stakeholder collaboration involving governments, research institutions, private sector, MSMEs, and communities.

6. **Capacity Building and Knowledge Sharing**

   It was agreed that continuous learning, knowledge exchange, and capacity development are essential to mainstream circular practices and reduce FLW effectively.

7. **Policy and Institutional Support**

   Participants recognized the need for supportive policies, regulatory frameworks, and institutional mechanisms to accelerate the transition towards circular agri-food systems.

7.2 Recommendations

Based on the discussions, the following recommendations were proposed:

A. Policy and Governance

- Integrate circular economy principles into national and regional agri-food policies and strategies.

- Strengthen regulatory frameworks to promote sustainable production, packaging, and waste management.
- Encourage incentives for circular innovations and sustainable business models.

B. Technical and Innovation Measures

- Promote sustainable packaging solutions and alternatives to single-use plastics.
- Support the development and adoption of circular technologies for valorization of by-products and waste.
- Scale up digital and interactive tools to map circular opportunities across value chains.

C. Supply Chain and Market Interventions

- Improve supply chain efficiency to minimize post-harvest losses.
- Strengthen food recovery and redistribution networks to channel surplus food to vulnerable populations.
- Enhance MSME participation in circular agri-food systems.

D. Capacity Development and Awareness

- Strengthen capacity building for farmers, entrepreneurs, and stakeholders on circular economy practices.
- Promote awareness campaigns on food loss and waste reduction at household and community levels.
- Foster a "knowledge circular economy" through continuous knowledge sharing and collaboration.

E. Partnerships and Financing

- Strengthen public–private partnerships and international collaboration.
- Mobilize financial mechanisms and investments to support circular economy initiatives.

Annex (Reference Aids)
Annex A: Key Concepts and Frameworks

- Circular Economy in Agri-Food Systems
- Food Loss and Waste Reduction Strategies
- Value Chain Approach
- Sustainable Packaging and Resource Efficiency
- By-product Valorization and Bioeconomy

- Public–Private Partnerships

Acronyms:

FLW	Food Loss and Waste
FAO	Food and Agriculture Organization of the United Nations
MSMEs	Micro, Small and Medium Enterprises
CE	Circular Economy
SDGs	Sustainable Development Goals
GHG	Greenhouse Gases
EU	European Union
PPP	Public–Private Partnership
R&D	Research and Development
APARI / APAARI	Asia-Pacific Association of Agricultural Research Institutions
IIWM	International Institute of Waste Management
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
APAC	Asia-Pacific Region

FLW	Food Loss and Waste
FAO	Food and Agriculture Organization of the United Nations
MSMEs	Micro, Small and Medium Enterprises
CE	Circular Economy
SDGs	Sustainable Development Goals
GHG	Greenhouse Gases
EU	European Union
PPP	Public–Private Partnership
R&D	Research and Development

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