AGRI MAGAZINE
(International E-Magazine for Agricultural Articles)
Volume: 03, Issue: 04 (April, 2026)
Available online at http://www.agrimagazine.in
©Agri Magazine, ISSN: 3048-8656

Management of Food Wastage in Extension Perspectives

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The management of food wastage represents a critical challenge in contemporary global food systems, necessitating comprehensive strategies and collaborative efforts across various stakeholders. This paper examines the importance of addressing food waste from an extension perspective, encompassing interventions at every stage of the food supply chain. By leveraging extension services, stakeholders can implement targeted initiatives aimed at reducing food losses, enhancing efficiency, and promoting sustainable practices. This paper discusses key components of food wastage management, including awareness and education, optimization of production and harvesting techniques, efficient post-harvest handling, market access and infrastructure development, food processing and preservation methods, consumer behavior change, policy advocacy, and monitoring and evaluation. Through a multifaceted approach, extension services play a pivotal role in fostering a more resilient, equitable, and environmentally sustainable food system that minimizes waste and optimizes resource utilization. Food wastage underscores the importance of collaboration, innovation, and continuous improvement in addressing the complex challenge of food wastage from an extension perspective.

Keywords: Extension perspectives, Food Wastage, Management and Policy

Introduction

Food waste is a globally significant issue that poses a threat to achieving sustainable development, maintaining food market stability, supporting human population growth, and ensuring the well-being of people. Globally, approximately 1.3 billion tons of food produced for human consumption are wasted each year. Except for economic and social issues, these high amounts of unconsumed food also greatly contribute to global environmental problems, e.g., climate change, water scarcity as well as increasing deforestation and species extinction. According to FAO, food wastage is defined as "Any food lost by deterioration or waste. Thus, the term wastage encompasses both food loss and food waste". Food Waste Index Report 2021 defines food as 'any substance, whether processed, semi-processed, or raw, that is intended for human consumption. Thus, food also includes drinks and any substance used in manufacturing, preparing or treating food. According to recent estimates, Food loss and

waste account for 8-10% of global greenhouse gas emissions, which in turn contributes to climate change and extreme weather events (Divyani, 2022).

Food Wastage is defined as any food disposed from the food supply chain, which includes food production, distribution and consumption (Aschemann-Witzel et.al.,2015). Food waste (FW) is food suitable for human consumption that is thrown away, regardless of whether it has expired or gone bad. This may be due to reasons such as oversupply, a lack of sale markets, or individual consumer decisions, including excessive or unplanned purchases (Jungowski,2021).

As per FAO (2020) report 14% of whole foods produce degrade before being sold and 17% of total food is lost at household level and this wastage mostly originates during shopping, storing and serving i.e., purchased and never prepared, prepared and never served or served and never eaten. Household is the primary sources of food preparation and wastage. Food wastage is not the result of a single behavior, but a combination of multiple behaviors and range of complex factors which includes food short expiration period, limited or poor storage capacity, lifestyle and valuations of product quality attributes like taste, health, process and convenience.

Food Waste Issues

Food waste is a pressing global issue that affects both our environment and our ability to combat hunger and malnutrition. In 2019, 17% of all food available to consumers ended up being thrown away.811 million people suffer from hunger, 2 billion face micronutrient deficiencies, and millions of children experience stunting and wasting due to under-nutrition. The problem of food waste is not limited to wealthy nations alone; it impacts every country worldwide (New.UN. Org) Bad weather, processing issues, overproduction, and unstable markets contribute to food loss even before it reaches grocery stores. Overbuying, poor planning, and confusion over labels and safety lead to food waste at stores and in homes (www.foodprint.org).Decomposing food waste produces methane, a potent greenhouse gas that contributes to global warming. One-third of food produced globally is thrown away uneaten, putting an increased burden on the environment (www.hshp.harvard.edu).Food waste comes with a staggering price tag, costing the United States approximately $218 billion per year (www.foodprint.org). Reducing food loss and waste strengthens the sustainability of food systems and improves planetary health. Innovation, such as new packaging to prolong shelf-life and smartphone apps connecting consumers and producers, can help reduce waste. With less than nine years left to achieve Sustainable Development Goal (SDG) 12, urgent action is needed to halve per capita global food waste by 2030 ((New.UN. Org). Composting food waste is better than sending it to landfills. Preventing waste in the first place lessens its impact on the environment. Investment in innovation, technologies, and infrastructure is crucial for efficient food system.

Stages of Food Wastage:

According to FAO reports, food waste occurs at various stages throughout the supply chain. It begins with production and extends to the consumer (Lahari et al., 2023). The main stages of food waste include production, post-harvest handling, storage, processing and packaging, distribution, retail, and consumption.

1. Production:

At this stage, food loss occurs during farming, harvesting, and handling (Herrero et al, 2018). According to Zmienka et al. (2020), farmers waste food because they overproduce without taking into account unforeseen circumstances like pests and weather. Furthermore, inadequate harvesting methods might result in early harvesting and crop damage, which significantly increases food waste (Ishangulyyev et al., 2019). Additionally, producers are influenced by shifting market standards and demand to leave crops unharvested since harvesting costs are higher than earnings. This causes unharvested crops to sustain damage, which results in waste. But in order to create a sustainable supply chain, it is essential to address food waste at the agricultural production level (Elimelech et al., 2019).

2. Post-harvest handling and storage:

In the food supply chain, post-harvest handling and storage are crucial phases when substantial food loss happens (Yahia et al., 2019). Contamination also results from rat attacks and pest infestations during storage. According to Elik et al. (2019), inadequate storage conditions can also cause mould and fungus to grow on food, rendering it unfit for ingestion. According to Kumar and Kalita (2017), farmers may decide to postpone harvesting for financial reasons, such as low demand or a return that is insufficient to cover production costs.

3. Processing and packaging:

Due to improper handling, manufacturing, and storage occurring at processing and packaging. However, in order to comply with safety regulations, food producers produce food waste because even a small processing or packaging error can result in the product being rejected (Rohini et al., 2020). Additionally, food items that are safe and edible but do not meet cosmetic criteria are discarded due to inadequate quality control during manufacturing. Additionally, equipment failures and technical inefficiencies lead to food waste during processing and packing (Wohner et al., 2019). According to Jagtap and Rahimifard (2019), human errors in processing, such as improper mixing and cooking times, result in the creation of inappropriate goods. For example, contamination and spoiling caused by packaging flaws render the food unfit for sale (Thakali & MacRea, 2021).

4. Distribution and Retail:

It involves transporting of food between places such as farms, factories and storage facilities, as well as market activities that enable consumers to access products (Corrado & Sala, 2018).Similar to this, food waste in the retail stage consists of unsealed items that must be recycled or disposed of, creating significant business difficulties (Teller et al., 2018). Furthermore, food waste in the retail industry refers to the disposal of food items that are unsold and need to be disposed of, which results in a significant business issue of growing costs (Teller et al., 2018). Additionally, shops overstock and buy products to satisfy customers' demands for variety and accessibility (Riesenegger & Hésner, 2022).

5. Consumption (household and food services):

Food wastage refers to unused food products and leftovers at household, restaurant, or business levels (Principato, 2018). By carefully organising their purchases and storage, consumers can greatly reduce food waste in their homes (Roy et al., 2023). According to Lahiri et al. (2023), a considerable percentage of food waste is caused by overshopping, poor planning, bulk purchase, not eating before the expiration date, and wasting food during preparation, cooking, or serving. Furthermore, improper storage practices lead to food items spoiling and being discarded prematurely (Witzel et al., 2018). Furthermore, excessive preparation and serving in larger portion sizes than necessary frequently lead to food waste at the home and food service levels (Stangherlin, 2018). Future initiatives, however, can greatly minimise food waste at this point, which is impacted by four primary factors: household size, income, culture, and demographics (Ishanglyyev et al., 2019).

Extension Opportunities/Perspectives

Managing food wastage effectively, especially from an extension perspective, involves a multi-faceted approach that includes:

- It makes logic for Extensionists to become involved at the producer level and assist farmers in reducing food waste by establishing relevant policies and procedures for gleaning extra harvests and distributing surplus food to nearby food banks and pantries. Many farmers do, in fact, already contribute their leftover food to nearby food banks, viewing this as a benevolent act (Campbell & Munden-Dixon, 2018).
- People can collaborate with local food councils to educate local restaurants, schools, and institutions on how to donate leftover food to community food pantries, soup kitchens, and food banks.
- Enlisting master gardeners to encourage people to compost their food waste is another way that Extension can help reduce the quantity of food waste that ends up in landfills.

- Extension 4-H and youth educators can utilize public speaking contests, food preservation workshops, and community service projects, such as volunteering at nearby farms or working at local food banks, to raise awareness about the issue of food waste among young people.
- Extension helps raise awareness among our audiences through various means, including rallies, campaigns, and interventions, about the importance of reducing food waste and its potential long-term effects.
- Implementing various innovative digital technologies such as apps to track food inventory, suggest recipes based on available ingredients, consider solutions like cold storage and temperature-controlled storage facilities or alert users about impending expiration dates can help reduce food waste and extend shelf life.
- Food waste reduction works by focusing on researching and mapping the specified area's food flows, mainly on Gender-specific challenges, thereby helping to bridge the gap between hunger relief organizations and potential donors, while also building more data and tracking capacity.
- Advocate for supportive policies and regulations at the local, national, and international levels to create an enabling environment for food waste reduction.
- Continuous research on the causes of food waste and the effectiveness of various management strategies is essential for ongoing improvement.
- Extensionists can bring community-based initiatives to reducing food wastage such as Eco-friendly Food Fridges, Rescuing Imperfect produce, Food Sharing Programs and Urban composting (curbside pickup, turning organic waste into compost for community gardens).
- An organization or consultancy needs to be set up to address the gaps between food suppliers and consumers through NGOs or retired extensionists in society.
- The primary area for extension interventions is mainly in developed countries, such as training in improved techniques like offering farmer field schools and hands-on demonstrations, optimal harvesting times and methods, post-harvest handling, and sustainable crop management.
- Promoting and facilitating the adoption of technologies such as Purdue Improved Crop Storage (PICS) bags, solar dryers, and extraordinary chambers, which extend their shelf life, and training on cold chain management.
- Connecting farmers directly with the processors and markets in order to reduce rejections based on aesthetic standards or oversupply and advocating for flexible quality standards.
- The mandate of extension must expand to address downstream waste, leveraging educational and social innovation approaches, including improving food literacy (best before vs. use by), promoting meal planning and portion control, and addressing aesthetics to enhance consumer perception and acceptance of “imperfect” produce.
- Working with businesses to implement better inventory management and demand forecasting systems, facilitate food donation programs and encourage composting or other valorization methods for unavoidable waste.
- Extension plays a key role in promoting the circular bioeconomy, where food waste is viewed as a source for promoting upcycling. This includes using food scraps for animal feed, converting organic waste into compost or organic fertilizer to enhance soil health, and implementing anaerobic digestion for biogas and energy generation.

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