Food Waste Reduction and Valorization: Toward a Circular and Sustainable Food System.

Aniruddha Abas*

Residual Chemical Assessment Division, National Institute of Agricultural Sciences, Korea

Introduction

Globally, nearly one-third of all food produced—about 1.3 billion tonnes—is wasted each year, according to the Food and Agriculture Organization (FAO). This not only represents a massive economic loss but also contributes significantly to environmental issues such as greenhouse gas emissions, land degradation, and water scarcity. As the world grapples with food insecurity and climate change, food waste reduction and valorization have emerged as critical strategies. Reducing food loss at the source and converting unavoidable waste into valuable products can transform a linear food supply chain into a more circular, sustainable system. Valorization, in particular, reimagines food waste as a resource, enabling the extraction of energy, bio-based materials, nutrients, and more.

Food loss typically occurs during production, post-harvest, and processing.Food waste usually refers to discarded food at the retail and consumer levels.Decomposing food in landfills emits methane, a potent greenhouse gas.Wasted food squanders the water, land, and energy used in its production.Food waste accounts for roughly 8–10% of global GHG emissions. The global economic cost of food waste is estimated at $1 trillion per year.Wasting food in one region exacerbates food insecurity in others.Implement better forecasting, inventory, and storage systems in supply chains.Promote "ugly" produce sales to reduce waste due to aesthetic standards.Improve food labeling to reduce confusion over "best before" vs. "use by" dates.Encourage smaller portion sizes and composting at the consumer level.

Establish food rescue networks to divert surplus food from retailers and restaurants to food banks.Legal and logistical frameworks to protect donors and streamline food recovery. Awareness campaigns about food planning, preservation, and creative reuse.Apps and tools to help track household food inventory and expiry dates.

Valorization turns unavoidable or inedible food waste into valuable by-products, thus closing the loop in the food system. Organic waste is biologically decomposed into nutrient-rich soil amendments.Enhances soil health and reduces the need for chemical fertilizers.Microorganisms break down food waste in oxygen-free conditions to produce biogas and digestate.Biogas can be used as renewable energy; digestate as fertilizer.Properly processed food waste can be repurposed as animal feed, reducing feed costs and resource use.Extraction of bioactive compounds (e.g., antioxidants, enzymes) from food waste for use in cosmetics, pharmaceuticals, and nutraceuticals.Conversion into bioplastics and biodegradable packaging.Waste sugars and starches are used to cultivate microbes that produce enzymes, biofuels, and other bio-based chemicals.Targets a 50% reduction in food waste by 2030 under its Farm to Fork Strategy.Achieves one of the world's highest recycling rates for food waste through strict regulations and RFID-based composting bins.Companies like Too Good To Go, Winnow, and Apeel are innovating with tech-driven waste reduction and shelf-life extension.

Conclusion

Reducing and valorizing food waste is no longer optional—it is an environmental, economic, and ethical imperative. Prevention must be prioritized, but where waste is unavoidable, valorization offers a sustainable way to extract value from what would otherwise be discarded. A truly circular food economy requires collaboration across governments, industries, and consumers, supported by innovation and strong policies. By transforming food waste into opportunity, we can nourish both people and the planet.

References

1. Genchi G, Carocci A, Lauria G, et al. Nickel: Human health and environmental toxicology. Int J Environ Res Public Health. 2020;17(3):679.
2. Bambino K, Chu J. Zebrafish in toxicology and environmental health. Curr Top Dev Biol. 2017;124:331-67.
3. Bobb JF, Valeri L, Claus Henn B, et al. Bayesian kernel machine regression for estimating the health effects of multi-pollutant mixtures. Biostatistics. 2015;16(3):493-508.
4. Erick P. Botswana: country report on children's environmental health. Rev Environ Health. 2020;35(1):9-14.
5. Fernandes AS, Mello FV, Thode Filho S, et al. Impacts of discarded coffee waste on human and environmental health. Ecotoxicol Environ Saf. 2017;141:30-6.
6. Richardson P, Tillewein H, Antonangelo J, et al. The Impact on Environmental Health from Cemetery Waste in Middle Tennessee. Int J Environ Res Public Health. 2024;21(3):267.

***Correspondence to**: Aniruddha Abas, Residual Chemical Assessment Division, National Institute of Agricultural Sciences, Korea. E-mail: abasniruddha@gmail.com

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7. Coombs S, Sleeth DK, Jones RM. Environmental and occupational health on the Navajo Nation: a scoping review. Rev Environ Health. 2022;37(2):181-7.
8. Helser J, Vassilieva E, Cappuyns V. Environmental and human health risk assessment of sulfidic mine waste: Bioaccessibility, leaching and mineralogy. J Hazard Mater. 2022;424:127313.
9. Richardson P, Tillewein H, Antonangelo J, et al. The Impact on Environmental Health from Cemetery Waste in Middle Tennessee. Int J Environ Res Public Health. 2024;21(3):267.
10. Poudel K, Ketema RM, Thi Thu Ngo H, et al. E-waste in Vietnam: a narrative review of environmental contaminants and potential health risks. Rev Environ Health. 2023.

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