

Trending Smart Agricultural Techniques in Postharvest Handling to Mitigate Climate Change Impacts in Sri Lankan Context



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Abstract Postharvest losses are very common and occur due to poor infrastructure and logistical arrangements, lack of technology, and insufficient knowledge, skills and management capacity of supply chain stakeholders. In Sri Lanka, the annual loss of fruits and vegetables during postharvest operation is around 30%–40% of the harvest and 20%–40% of the total harvest. High levels of postharvest losses may be the result of the lack of awareness and concern on proper postharvest practices, improper storage, harvesting methods, and packaging techniques. Most agricultural systems are mainly sensitive to climate change such as disparity in temperature and precipitation, which results in the high cost of agricultural management. Global warming, greenhouse gas emission, and increased atmospheric temperature not only threaten the crops but also the postharvest life of agricultural products. The postharvest losses are intensified by climate change, which leads to food insecurity and severely hampers smallholder farmers. Therefore, the food losses in the postharvest supply chain due to the differences in climate change must be reduced using advanced and innovative technologies. These include climate-smart processing technologies, solar energy-based techniques, thermal and non-thermal technologies, cutting-edge

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technology, ZigBee and sensor technologies, zero energy cooling chambers, novel, and intelligent packaging technologies, Internet of things (IoT), advanced plant breeding technologies, advanced food quality management strategies, automation, and advanced imaging technologies. Decisively, fostering awareness and education of farmers through extension services with the modern applications of postharvest operations will reduce the overall food losses and ensure food security by mitigating climate change.

Keywords Advanced technologies · Climate change · Food security · Mitigation · Postharvest technology

1 Introduction to Postharvest Technology

Postharvest technology is the discipline and system applied to agricultural products after harvest until it reaches the final consumer with the desired nutritional requirements. This system consists of product protection, processing, packaging, marketing, and delivery (NIC, 2021). The postharvest processing comprises many common operations implemented after harvesting of produce including drying, threshing, shelling, milling, storage, packaging, and marketing. The objective of using postharvest technology is to preserve and improve the quality of the products and make them readily saleable in order to cater ever-increasing food demand (NIC, 2021).

Postharvest technology should meet the food required by the expanding population with the elimination of losses and make available more nutritive food with appropriate processing methods and value addition techniques. The world's population has been forecasted to reach 9.7 billion in 2050 (The World Bank, 2016; Tian et al., 2016) and the food supplies for the entire population will be more demanding. Therefore, it is necessary to boost global food production while ensuring food security, maintaining food demands of the expanded population, and combating malnourishment; hence, most countries have concentrated on expanding agricultural productivity (Jayarajan et al., 2021).

2 Postharvest Losses

Postharvest losses are very common and occur spontaneously from harvesting to consumption, where postharvest processing loss of fruits and vegetables is up to 30% per year (FAO, 2011; Yahaya & Mardiyya, 2019). Around 25–30% of the worldwide food is wasted from on-farm food production to storage facility at a retail, because of inadequate food supply chain management and food spoilage (Shafiee-Jood & Cai, 2016). The farm-level postharvest loss is around 75% and the remaining is lost at the market level (Basavaraja et al., 2007).