

# **Quality and Safety Issues in Fruit and Vegetable Supply Chains in Sri Lanka: A Review**

**Ruvini Vidanapathirana  
Jayamini Champika  
Roshini Rambukwella  
Nalaka Wijesooriya**

Research Report No: 217

June 2018

**Hector Kobbekaduwa Agrarian Research and Training Institute  
114, Wijerama Mawatha  
Colombo 7  
Sri Lanka**

## EXECUTIVE SUMMARY

Fruits and vegetables make a significant contribution to food security, nutrition, poverty reduction and promoting economic development. The potential of cultivating fruits and vegetables in Sri Lanka for domestic and export markets is remarkable. This sector can make significant strides if developed it. Similarly improving the quality and safety of fruits and vegetables supplied to domestic and export markets is important considering the significant contribution it can make to increase the level of national income, generate new employment opportunities, increase farm income and enhance nutrition and health of the people. Poor quality and safety are the major roadblocks found in traditional fruit and vegetable supply chains mainly due to poor handling/sorting, inappropriate storage and transport, improper pesticide and fertilizer use. The growing public concern over the quality deteriorated due to post-harvest losses and presence of chemical residues in the harvested fruits and vegetables has become a pressing issue in Sri Lanka. In the recent past various malpractices committed by various actors such as farmers, collectors, and traders throughout the supply chains were reported. In addition to post-harvest losses, food adulteration with harmful chemicals reached an alarming level causing numerous health hazards. Therefore, the objectives of this study were to review issues related to post-harvest losses and food adulterations (E.g. pesticides, ripening agents, and preservatives) in fruit and vegetables supply chains in Sri Lanka and to identify studies towards minimizing and overcoming post-harvest losses in the country. Identifying the institutional level measures to minimize quality and safety issues in fruits and vegetable supply chains in the country is another aim. The literature survey was based on academic papers and industry related documents.

Quality and safety of fruits and vegetables produced in Sri Lanka suffer from improper pesticide and fertilizer use, poor methods and practices from production to post-harvest stage. There is minimal intervention at the production or growing stage to ensure quality and safety. Post-harvest losses of fruits varied between 20-40 percent with the highest loss recorded for papaya and for vegetables it was 20-46 percent with the highest loss recorded for okra due to unsatisfactory packaging, lack of ventilation in the lorries, poor facilities for handling produce in the Colombo wholesale market and the extreme traffic congestion and inordinate delays before unloading. However, the loss is minimum in supermarket chain reported as two to six percent and five to ten percent in export chains. The most important post-harvest diseases and disorders in Sri Lanka are anthracnose, stem end rot, water blister and internal browning of pineapple. Soft nature of fruits and vegetables, high water content and high rate of respiration contribute to losses. Bruising is the major factor causing rotting. Horticultural products are easily bruised, rendering the product unsaleable due to their soft texture. Therefore, all horticultural products should be handled gently to reduce losses due to bruising and rotting. Bruising is probably one of the major causes of losses in Sri Lanka.

The Institute of Post-Harvest Technology (IPHT) launched a development project to introduce plastic crates to fruit and vegetable supply chains at 50 percent and 75

percent subsidized prices to curtail the losses. Furthermore, a regulation came into force making safe packaging compulsory for fruit and vegetable transportation to minimize post-harvest losses and to ensure supply of quality produce to the consumer. However, studies show that the use of safe packaging was limited due to many constraints and limitations. Most common were unavailability of plastic crates, high cost of transportation, load transported per journey being limited due to safe packaging and absence of an assured mechanism of returning safe packages moving through the supply chain. Unlike for vegetables, safe packages are used for packing and transporting fruits such as mango, papaya and guava in conventional supply chains. Mostly used safe packages were plastic crates, corrugated fiberboard boxes and wooden boxes.

Improved technologies alone cannot prevent post-harvest losses because the effect of the pre-harvest factors such as crop management, field sanitation also contributes to crop losses. Pre-harvest fungicide treatment, sanitation, bagging and other field management practices and careful post-harvest handling can reduce a majority of post-harvest disease problems. Factors affecting the safety of fruits and vegetables include naturally-occurring toxicants, natural contaminants such as fungal toxins (mycotoxins) and bacterial toxins and heavy metals (cadmium, lead, mercury); environmental pollutants; pesticide residues and microbial contamination. The problem of contamination of food sources, especially vegetables by pesticide residues poses a serious challenge to public health. Pesticide usage is not properly regulated due to ineffective legislation, lack of awareness and technical know-how among the farming community in Sri Lanka. Except a few monitoring studies, no comprehensive studies have been undertaken to determine the pesticide residues in vegetable and fruit in the country. Farmers lack information and knowledge on the safe and effective use of pesticides.

Globalization of the food supply chain has posed new challenges by way of food safety and quality issues. With increased trade in fresh and processed food, there is a growing concern about food safety issues in Sri Lanka. When exploiting the export potential for fruits and vegetables, the safety risk of these foods to meet international market requirement is necessary. It is important to maintain higher levels of quality and safety measures consistent with EU regulations and US Food and Drug Administration. Therefore, effective quality control systems are needed to meet export market requirements for fresh and processed fruits and vegetables from Sri Lanka. In September 2016, there was an audit by the EU to evaluate control of pesticides in food of plant origin. When exporting to those countries, it is important to have GAP certificate from the Department of Agriculture (DOA). As a solution for safety and quality issues in agriculture products, the Good Agricultural Practices (GAP) programme was introduced in January 2015. Under this, application of fertilizer, pesticide and weedicide, harvesting, processing, transportation, grading, packing, value addition, labeling, distribution and storage processes will be monitored by the Department of Agriculture. This will help control microbial, chemical and physical hazards associated in all stages from production to packaging of fruits and vegetables.

In Sri Lanka, the task of ensuring food safety is conducted in a largely adhoc manner, tasks are dispersed to a number of government agencies and departments such as the Department of Agriculture, Consumer Affairs Authority, the Sri Lanka Standards Institute, Atomic Energy Authority, Sri Lanka Customs – Quarantine Department and the Ministry of Health, based on their respective areas of expertise. Lack of sufficient national standards to measure food safety and effective institutional mechanism to enforce food safety at different stages in the food chain are the major issues related to food safety in the country. Sri Lanka Food Act No.26 of 1980 is the main legislative document covering some aspects of food safety. The Act is basically implemented through Director Health Services (DHS) in the Ministry of Health, Nutrition and Indigenous Medicine through local authorities and respective MOH offices in the region. DGHS is the chairman of Food Advisory Committee (FAC) consisting 25 representatives from agencies implementing various aspects outlined in the Act.

The official inspection service under the Food Control Administration Unit (FCAU) lacks coordination and integration with other government agencies of the local food chain while public based health surveillance system lacks muscle and time to cover agricultural produce and supplies aspects.

Use of synthetic chemicals that induce fruit ripening is a persistent issue in Sri Lanka. Although section 26 of the food regulation of 1993 explicitly prohibits the use of calcium carbide it is practised unabated with regard to artificial fruit ripening. Excessive use of these chemicals poses a serious threat to human health. This review emphasizes the need for a national policy to minimize post-harvest losses of fruits and vegetable the government to take initiatives and allocate resources to improve the post-harvest handling conditions, thereby improving the socio-economic status of the stakeholders in fruit and vegetable supply chains.

It was found that malpractices observed in fruit and vegetable supply chains can largely be attributed to poor knowledge of stakeholders associated with fruit and vegetable chains. As a result the consumer will fall prey to the improper use of pesticides. Therefore, education and training of these farmers in pesticide management is a timely move. Farmers' safe handling of pesticide should be looked into. Training of farmers in post-harvest handling, food safety both for the domestic market and international trade is important. Strict enforcement of laws curbing production and sale of fruits and vegetables subject to harmful chemical exposure should be observed.

This review highlights the importance of continued research to develop easy-to-use practical test kits to identify chemicals, pesticides, additives, preservatives and toxic elements at production, processing, distribution and consumption levels. Investment is a vital component in developing testing infrastructure to achieve international standards and accreditation.

Further, the study underlines the need for a cost effective safety assurance system for the higher satisfaction of consumers by the government with a separate market window to provide safe vegetables to consumers. Strict regulations on the quality of imported fruits are also important.