Food and Agriculture Organization
of the United Nations

FOOD LOSS AND WASTE REDUCTION SAVE FOOD INITIATIVE ON FOOD LOSS AND WASTE REDUCTION SAVE FOOD INITIATIVE ON FOOD LOSS AND WASTE REDUCTION

POLICY MEASURES FOR MANAGING QUALITY AND REDUCING POST-HARVEST LOSSES IN FRESH PRODUCE SUPPLY CHAINS IN SOUTH ASIAN COUNTRIES

Smallholders and traders are key stakeholders in fruit and vegetable supply chains supplying local mass markets across South Asian countries. Training these stakeholders and introducing simple technical innovations into these supply chains can dramatically improve the quality and shelf-life of fresh produce and reduce losses, thereby generating economic benefits for producers, supply chain stakeholders and consumers as well as improving nutrition. Consequently, greater support is called for to address the challenges faced in traditional supply chains.

INTRODUCTION

Fruits and vegetables are rich sources of vitamins and micronutrients and contribute significantly to the nutritional quality of South Asian diets. High levels of post-harvest losses increase the cost of fruits and vegetables for consumers and result in reduced income for stakeholders handling fresh produce in the supply chain, particularly farmers who bear the cost of losses at the wholesale and retail levels because of low farmgate prices. Losses also represent a waste of land, labour, water, energy and the inputs that go into producing the fresh produce.

IMPORTANCE OF FOOD LOSS IN SOUTH ASIAN COUNTRIES

Food systems in South Asian countries are changing

Food systems in South Asian countries are currently being transformed by a number of demographic and social factors. The population continues to increase across the subregion and urbanization is increasing. Food produced in rural areas must travel longer distances from farm to markets to supply the nutritional requirements of the growing urban population; many still shop at traditional wet markets for their fruits and vegetables. At the same time, the rapid growth of supermarkets has caused a growing demand for safe, high quality produce, which has opened up new market opportunities and greater income for smallholders who can adopt better practices and differentiate their fresh produce to target these markets, while still supplying traditional fresh markets. The economic and nutritional importance of traditional fruit and vegetable supply chains, therefore, warrants governments' specific focus to address deficiencies related to post-harvest systems in these supply chains.

Stakeholders have scarce knowledge of post-harvest handling in the fresh fruit and vegetable supply chain

Smallholders are the main producers of fresh fruits and vegetables consumed in local markets across South Asia. Together with other stakeholders in traditional supply chains – harvesters, traders, transporters, processors, wholesalers and retailers – they supply the food requirements of the region's mass markets. Stakeholders in these traditional supply chains lack the basic knowledge of good post-harvest handling practices and the organizational capacities to address quality management

TABLE 1
Post-harvest losses for fruits and vegetables in South Asian countries

Crop	Losses (%)
Banana	29
Cauliflower	52
Mandarin	20
Mango	38
Snap beans	52
Winter tomato	46

Source: Field data.

in fresh fruit and vegetable supply chains. Moreover, stakeholders need assistance in accessing capital so they can invest in acquiring the local technologies to upgrade their practices. A sound body of knowledge concerning good post-harvest management principles can be found at academic and research institutions across the Region, but relatively little of this knowledge is extended to smallholders to improve the management of post-harvest systems. Strengthening networking among these institutions would contribute greatly to enhancing knowledge and technology exchange across the subregion.

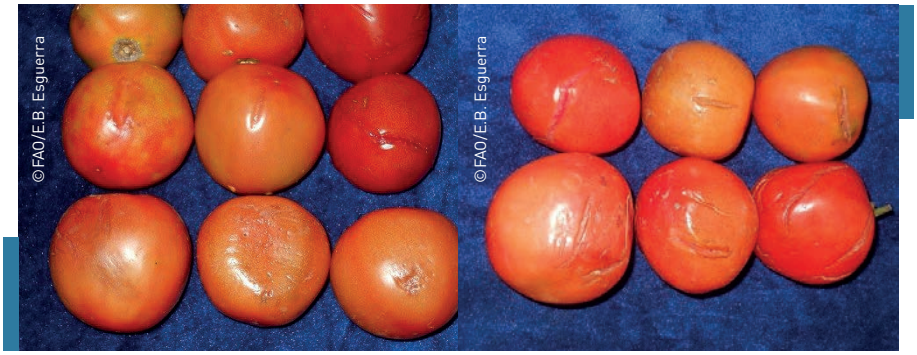
TABLE 2
Post-harvest losses in bulk-packaged fruits and vegetables transported from rural to urban centres in South Asian Countries

Crop	Loss during transportation in mesh sacks (%)	Loss during transportation in plastic crates (%)	Percentage of loss reduction
Tomato	16.7	2.2	97.8
Banana	5.4	2.1	61
Cauliflower	11	4.5	60
Mandarins	7.2	4.1	43
Snap beans	18.0	7.3	60

Source: Field data.

PHOTO 1
Tomatoes packaged in plastic crates and in mesh sacks for transportation from rural to urban markets in Bangladesh

PHOTO 2
Examples of mechanically damaged tomatoes transported in mesh sacks



Post-harvest losses in fresh fruit and vegetable supply chains are high

Pilot activities and measurements conducted during an FAO Technical Cooperation Project: TCP\RAS\3502, titled *Reduction of post-harvest losses in horticultural chains in SAARC Countries* in six prioritized fruit and vegetable supply chains in three South Asian countries, have shown that the magnitude of quantitative post-harvest losses in these chains ranges from 20 percent for mandarins, to 52 percent for cauliflower and snap beans (Table 1). These high losses are largely the result of mechanical damage and decay during storage and transport between harvest and the market. High levels of water loss, particularly at the retail level in fresh markets, also result in qualitative loss because of shrivelling and wilting, which results in significant economic loss to farmers.

A major cause of losses in traditional fruit and vegetable supply chains is inadequate bulk packaging

The piloting of improved post-harvest practices in fruit and vegetable supply chains, supported by the introduction of appropriate levels of post-harvest technologies, has highlighted that improved packaging practices can contribute significantly to maintaining the quality of fresh produce during transportation, thereby contributing to fewer qualitative and quantitative post-harvest losses in the supply chain. Fruits and vegetables, when packaged in traditional plastic sacks, are highly susceptible to mechanical damage – such as compression and abrasion (Photo 2). Switching from traditionally used plastic sacks as bulk packaging to plastic crates significantly reduced quantitative post-harvest losses for all the varieties of fruits and vegetables studied (Table 2).

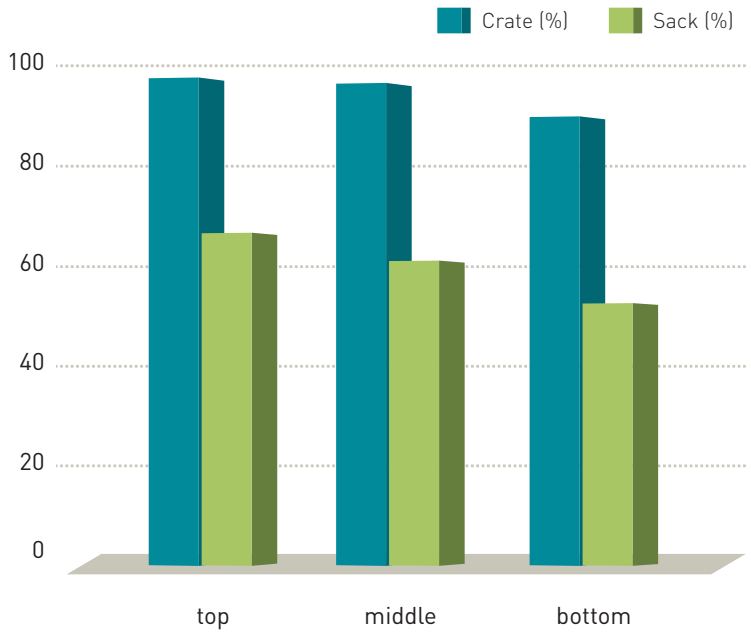
Use of plastic crates can substantially reduce qualitative losses – the number of sound fruit recovered was greater when fresh produce was transported in plastic crates instead of in mesh sacks. Qualitative loss in tomatoes transported in mesh sacks was, for example, higher at the bottom (Photo 2) as compared to the top and middle portions of the sacks, when compared to fruit packed in plastic crates.

Pre-harvest pest and disease infestations are a major cause of latent infections in selected fruits

Fresh fruit and vegetable quality is greatly impacted by pre-harvest management practices. Inadequate disease management practices during mango production result in pre-harvest infections that cause post-harvest diseases that manifest as decay at the retail level (Photo 3) and significant qualitative and quantitative losses that negatively impact the earnings of stakeholders in the supply chain.

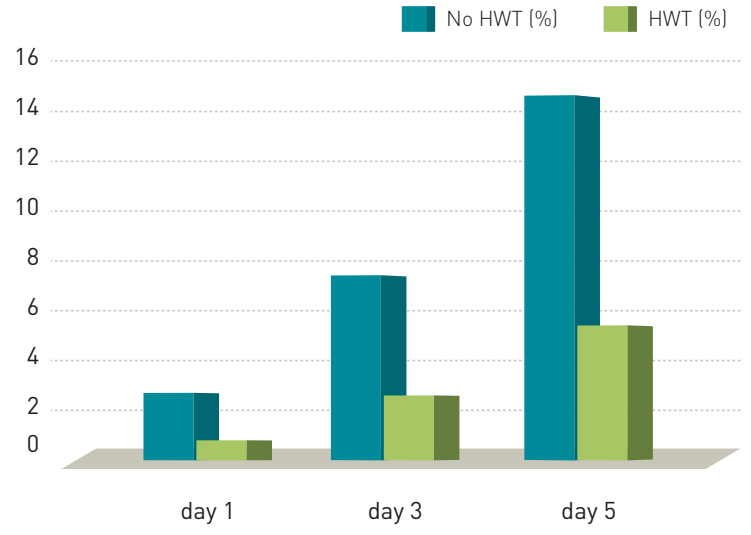
The application of a hot water treatment (HWT) to mangoes, within 36 hours after harvesting, is highly effective in minimizing post-harvest disease and decay (Figure 2), lengthening the shelf-life, enhancing quality and reducing losses.

FIGURE 1
Recovery of sound tomatoes transported in plastic crates versus tomatoes transported in mesh sacks (percentage)



Source: Field data.

FIGURE 2
Impact of hot water treatment in reducing decay of mangoes in retail (percentage)



Source: Field data.

Branding of HWT mangoes would differentiate them from untreated mangoes, and the higher returns from better quality fruit would raise incomes for stakeholders along the supply chain.

Access to appropriate levels of locally fabricated technologies contributes greatly to loss reduction while generating employment

Improvements in post-harvest handling practice necessitate the use of an appropriate level and scale of post-harvest technologies. Improvements introduced into mango post-harvest operations, have employed locally fabricated equipment including harvesting tools, delatexing trays and HWT tanks. The local manufacture of these tools and technologies makes them readily available and accessible to supply chain stakeholders, while generating backward links to the suppliers of these technologies and economic benefit through the generation of employment for local artisans.

PHOTO 3
Mangoes in retail, infected by post-harvest diseases: anthracnose (top), stem end rot and fruit rot (bottom) caused by pre-harvest infections

POLICY RECOMMENDATIONS FOR IMPROVING QUALITY MANAGEMENT AND REDUCING POST-HARVEST LOSSES IN FRESH PRODUCE SUPPLY CHAINS

- **Strengthen human resource and institutional capacities to support post-harvest systems development**
  - Strengthen capacities of farmers and stakeholders in the supply chain and develop capacities within extension systems to address quality management, safety assurance and loss reduction in fruit and vegetable supply chains.
  - Strengthen educational and research institutions to include extension approaches within their post-harvest curricula.
  - Support training and capacity-development for local small and medium sized enterprises (SMEs) that engage in the fabrication of post-harvest technologies for local markets.
  - Support the organization of smallholders for capacity-development and better access to improved technologies and practices.
  - Promote and facilitate the establishment of national and regional networks for information and technology exchange on post-harvest systems development.
- **Provide an enabling environment to support post-harvest systems development**
  - In view of the importance of fruits and vegetables and their supply chains to nutrition, public goods should be provided – electricity, water, transport systems, communication technology and standards – to support the development of post-harvest systems in fruit and vegetable supply chains.
  - Smallholder organizations and supply chain stakeholders should be assisted when accessing finance, for example through credit schemes that have been designed to support the acquisition of post-harvest technologies such as plastic crates for bulk packaging, harvesting tools, hot water treatment tanks to eliminate pests and diseases.
  - Campaigns could be supported and implemented that would promote the economic, social (including nutritional) and environmental benefits of reducing post-harvest losses in fruit and vegetable supply chains.

PHOTO 4
Hot water treatment of mangoes

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