

BRIEF

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Post-harvest losses along value and supply chains in the Pacific Island Countries



Cover photo source: FAO-SAP Photos collection

This brief contains:

- ✓ Post-Harvest Losses (PHL) along value and supply chains
- ✓ Special case-1 (PHL along a commercial tomato supply chain)
- ✓ Special case-2 (PHL along cassava value chain)
- ✓ Impacts of PHL and
- ✓ Recommendations for postharvest management and PHL reduction



**Food and Agriculture Organization
of the United Nations**

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Purpose:

This brief focus on four questions:

- 1- When postharvest losses occur in perishable produces' supply and value chains in the (PICs) ¹?
- 2- What are the main causes of postharvest losses along supply and value chains?
- 3- What are the negative impacts of poor post-harvest management and postharvest losses?
- 4- What actions are recommended for the improvement of post-harvest management and post-harvest losses reduction in the PICs?

Post-Harvest Losses along perishable produces' supply and value chains

Annual food losses have been estimated around 1.3 billion tonnes around the world². The concept of food losses is defined differently, in developed countries food losses arise at the consumer stage and concerns food which is processed and ready to eat while in developing countries food losses occur at the post-harvest stages, during marketing and processing. Postharvest losses (PHL) occur along the entire value chain and vary in extent depending on the produce and the region.

In PICs supply chains of perishable produces for domestic markets are short and farmers, traders, wholesalers and retailers are the key actors. Almost all supply chains' actors are involved in value-adding activities. The most common value adding activities are sorting, grading, cleaning, transporting, storage, pre-cooling and packaging.

Postharvest losses in produce destined for the domestic market are comparably greater than in produce destined for export markets. This marked difference is primarily due to postharvest practices implemented by the farmer, and the leniency of the domestic market³. Losses incurred on the local market are the result of inappropriate postharvest handling and due to market surplus, particular during peak seasons.

Table 1: Critical losses points and specifications along generic food value chain

Basic elements	Sub elements	Critical loss points	Losses specifications
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¹ In this brief PICs are Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of the Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu and Vanuatu

² FAO. 2011. *Global food losses and food waste extent: causes and prevention*

³ FAO and APO (Asian Productivity Organization). 2005. *Postharvest Management of fruit and vegetables in the Asia-Pacific region*. http://www.apo-tokyo.org/00e-books/AG-18_PostHarvest/AG-18_PostHarvest.pdf

On-farm Production	-cultivate -grow -harvest -dry	-poor inputs -rough and untimely harvesting -poor harvesting tools & methods -high day time temperature	-edible crops leave in field -plough into soil -eat by birds -loss in quality -crop damaged, rodents
Transformation	-classify -process -pack -storage	-insects attacks -poor collection centers -limited packaging facilities -poor processing infrastructures -poor worker hygiene practices -poor storage and sanitation system	-spillage, contamination, wilting -process losses -inappropriate packaging damages -losses in quality -compacting -physical damage -microbial infections
Trade	-transport -storage -distribute -sell	-poor market infrastructures -limited storages facilities -poor market sanitation -mixed storing -poor transport system	-spoilage -chilling injury -physical damage -microbial infections -contamination
Final sale	-specific market -consumption	-poor produce display centers -poor storages -poor sanitation	-spoilage -microbial infections -losses in quality -physical damage

Source: GIZ (Oguntade.A.E).2013. *Food losses in cassava and maize value chains in Nigeria: Analysis and recommendation for reduction strategies*, FAO. 2011. *Global food losses and food waste extent: causes and prevention*.

Unstructured grading and packaging systems; poor infrastructure; poor knowledge of postharvest handling; high day-time temperatures; limited processing facilities; insect attack; diseases and poor field sanitation are the main factors contributing in the fruit and vegetable losses in Fiji³.

Case study-1-Postharvest horticultural losses along a commercial tomato supply chain in Fiji

This case has been studied by the Pacific Agribusiness Research for the Development Initiative (PARDI). In this study tomato producer and retailers are the key actors of commercial tomatoes supply chain from Sigotoka (farm) to Suva (central municipal market) in Fiji. Common value-adding activities such as ripening, sorting, grading, cleaning and transporting are performed by supply chain's actors. Due to poor postharvest handling practices and poor infrastructures (collection center, transport and storage) postharvest losses along supply chain (from farmer to vendor) were recorded **(32.93)** percent. Postharvest losses of tomatoes were recorded **(60.78)** percent in case of 3days delay in the market place. The removed tomatoes (32.93%) from the commercial supply chain were used as (11 %) for home and community trade; (6.34%) for domestic animal feeding and (15.59%) were thrown away.

Table 2: Postharvest horticultural losses along a commercial tomato supply chain in Fiji

Time	Location	Process	Losses %	Description
Day 1 to 4	Farm	Ripening	8.8%	Due to rots during ripening
Day 5	Farm pack-house	Packaging in plastic boxes	8.9%	Failed to ripen at the time of packing

Day 5	Transport	Transporting	0.13%	Distance 121.19 Km/ transported in truck
Day 6	Market	Selling	6.4%	Thrown away by vendor due to over ripe or rots
Total losses from (farm to vendor)			32.93 %	
	Post market losses/wastage			
Day 7	Market		8.26 %	In case of inappropriate storage facilities and if not consume in 3days (72 hours)
Day 8	Market		6.19 %	
Day 9	Market		13.4	
Total postharvest losses			60.78%	

Source: PARDI-Pacific Agribusiness Research Development Initiative. (Steven. J.R.U). Not dated. *Postharvest horticultural losses a long a commercial tomato supply chain in Fiji*⁴.

Due to poor postharvest handling practices, in both domestic and export supply chains, farmer suffered from quantitative and qualitative postharvest losses. Produces such as yam, sweet potato, tomato and a variety of aroids, roots and tubers are highly perishable and as a result, post-harvest losses can be substantial⁵.

Box 1: Impacts of poor post-harvest handling and losses

unsustainable food supply and value chains
increase in food wastage
poor quality produces
decrease in produce's shelf-life
unsafe food products for the customers
limited access to nutrient food
limited market opportunities and poor prices and
low farm income

Case study-2- Postharvest losses along a cassava value chain:

This study focuses on cassava⁶ losses during harvesting, processing and marketing stages. The result is provided based on survey's information collected from farmers (200), marketers (30) and processors (55) of cassava in Nigeria. The main stakeholders of cassava's value chain in Nigeria are farmers, agro-processing companies, middlemen, traders and consumers (households, textile industries, pharmaceutical companies, paper and packaging companies etc.). Local farmers and agro-processing companies produce cassava; farmers, middlemen (mostly women) and agro-processing companies perform post-harvesting handling and processing activities while middlemen (mostly women) and agro-processing companies perform marketing and trading of cassava in Nigeria.

The cassava plant is a relatively new import to the Pacific. Cassava is easy to grow and simple to prepare and is becoming increasingly popular as a food and livestock fodder crop⁷. Cassava is

⁴ PARDI-Pacific Agribusiness Research Development Initiative (Steven. J.R.U). Not dated. *Postharvest horticultural losses a long a commercial tomato supply chain in Fiji*:

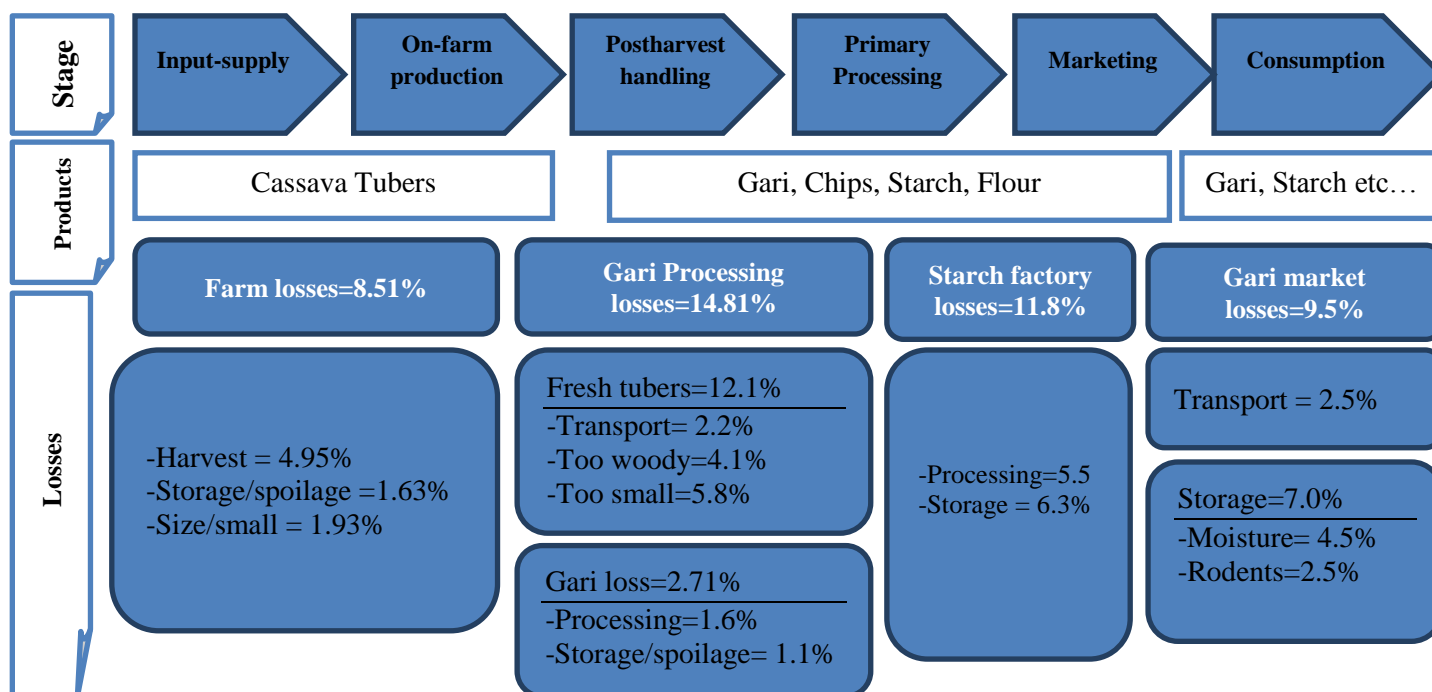
⁵ FAO (Keerthi.B.P). 2008. *Good practice for assuring the post-harvest quality of exotic tree fruit crops produced in Jamaica*

⁶ Cassava also known as (maniot in Cook Islands, tapioca or tavioka in Fiji, manioka in Samoa and manioc in Vanuatu)

⁷ FAO.2010. *Building Resilience to climate change. Pacific Food Security toolkit. Pacific root crops*

processed into gari⁸ for human consumption and in starch for the food and beverage industries. Cassava leaves are also edible and nutritious. Information of this case study can help cassava's value chain stakeholders in the PICs to know more about postharvest losses along cassava value chain and to be prepared for PHL reduction actions.

Figure 1: Post-harvest losses in cassava value chain



Source: GIZ (Oguntade.A.E). 2013. *Food losses in cassava and maize value chains in Nigeria: Analysis and recommendation for reduction strategies*

Causes of fruits and vegetables postharvest losses

Different reasons caused for postharvest losses (PHL) but main causes of fruits and vegetables post-harvest losses in developing and emerging markets are briefly listed here:

Box-2: Top ten causes of fruits and vegetables post-harvest losses in developing countries	
1	poor postharvest handling
2	poor packing and packaging
3	poor infrastructures and connectivity
4	poor cold chain, transport and climate control
5	poor storage facilities
6	poor marketing information and pricing
7	poor education and postharvest research and development (R&D)
8	poor processing capacity
9	poor investment capacity and credit access
10	poor quality standards and control

⁸ Gari (also known as garri, garry, tapioca) is popular West African food made from cassava tubers

Source: Wageningen University & Research Centre. 2014. *Reducing postharvest food losses in developing economies by using a Network of Excellence as an intervention tool*⁹.

Recommendations

Postharvest losses reduction are less costly relating to increasing in food production in the Pacific region where land and input resources are very limited for agricultural production. Governments, technical universities, value chain's stakeholders, donors and international development agencies in PICs should work together for postharvest losses reduction in the region by:

I. Strengthening Research and Development (R&D) institutions:

(a) research and recommend appropriate agricultural inputs for producing quality produces (b) study perishable agricultural produces within the context of its processing and market potential (c) develop farmers' friendly maturity indices and recommend appropriate harvest tools and methods (d) establish grading, sorting and packing protocols for different commodities (e) research and focus on temperature, relative humidity for different commodities under storage.

II. Improve access to information and capacity building:

(a) capacity building and working directly with farmers, traders and other value chains' stakeholders to accept and promote improved post-harvesting practices (b) capacity building on proper cold chain management (c) encourage simple agro-processing methods in the villages (e) establish regional post-harvest management and losses reduction information networking system.

III. Improve on farm post-harvest practices:

(a) Improve on-farm hygiene and packing practices (b) support small scale farmers in the basic infrastructures (packing house, cool storages) development and (c) help producers in value adding activities.

IV. Governments' policies improvement for PHL reduction:

(a) support the development and adaption of applicable postharvest management technologies (b) implement and monitor postharvest management standards (safety, maturity, grading and sorting) for domestic and export markets (c) develop contract farming and linkages among producers, processors, and traders (as PPPs) (d) make strong collaboration between producers, governments' agencies (ministry of agriculture, trade etc.), researchers and donors agencies for establishing priority projects and (e) increase public awareness campaigns to reduce postharvest losses in the consumption stages.

V. Increase investment to develop infrastructures:

(a) build collection centers in the rural areas near production places and equipped with sorting, grading, packaging, sanitation and storage facilities (b) build roads from farms to collection centers, storages and market places (c) invest in the processing factories equipped with suitable processing technology, good sanitation system, suitable packaging, and appropriate food safety and quality standards (d) Build market infrastructures and equipped with good storages and sanitation facilities

⁹ Wageningen University & Research Centre (L.H. Aramyan.L.H., Van Gogh.J.B). 2014. *Reducing postharvest food losses in developing economies by using a Network of Excellence as an intervention tool*. WU&RC. The Netherlands.
<http://www.ifama.org/files/conf/papers/988.pdf>