

Where is the postharvest loss occurring in the Cambodian bok choy supply chain?

Vivian Ku¹, Som Bunna², Houn Sereyvuth², Yim Somaly², Ngon Ngoy², Lorn Mensry², Sam Munnyneth³

¹ VVJ Consulting, Sydney, Australia

² Agricultural Engineering Department, Cambodian Agricultural Research and Development Institute, Phnom Penh, Cambodia

³ Faculty of Agronomy, Royal University of Agriculture, Phnom Penh, Cambodia



Supply chain:

Kandal Province → Phnom Penh → Siem Reap



Background

Leafy vegetables like bok choy are important crops for smallholder vegetable growers in Cambodia. Kandal is a particularly high production province. Kandal Province supplies local markets, Phnom Penh and markets as far as Siem Reap. Despite the apparent market opportunities for Kandal producers, postharvest loss is high, and quality and sale price are affected as a result. Postharvest loss is generally classed as:

1. *Outright loss* in which vegetables are rendered unsaleable due to disease, insect damage or physical damage during harvest, handling and transport operations
2. *Poor quality* in which produce of secondary quality receives a lower price in the market due to inferior appearance (e.g. size or colour) and/or flavour .

Monitoring damage and quality losses along the supply chain (from farm to market) is key to understanding where these losses are occurring and developing solutions to limit losses.

Methods

Three consignments of bok choy were mapped from farm in Kandal Province to Siem Reap from March to September 2015. Temperature/ humidity loggers were inserted into bags of bok choy to record temperature and humidity change from farm in Kandal Province to sale at a wholesale market in Siem Reap. The bok choy was packed into plastic bags with approximately 10kg in each bag as per common farmer/collector practices. Quality was assessed at each transit point in the supply chain (see conceptual supply chain to the left). Quality assessment included weight loss, yellowing, wilting, browning and rotting.

Results

Temperature

- At harvest the bok choy was exposed to temperatures between 32 and 42°C (Figure 1)
- In transit from Kandal to Siem Reap the bok choy was exposed to temperatures between 32 and 36°C (Figure 1)

Exposure to these high temperatures throughout the supply chain caused a deterioration in appearance and loss of nutritional quality. Upon arrival at Siem Reap (18 hours after harvest) 29% vegetable was considered unsaleable due to wilting.

Handling

The plastic bag packing provided no protection to the vegetables. In particular the bok choy was exposed to rough handling (e.g. throwing bags of bok choy or stepping on the bags during the loading and unloading process) causing damage. This resulted in accelerated browning at the cut stem and open wounds that can allow rot to rapidly take hold. For example, 10% of the bok choy was found rotting upon arrival at Siem Reap and 95% showed browning at cut stem.

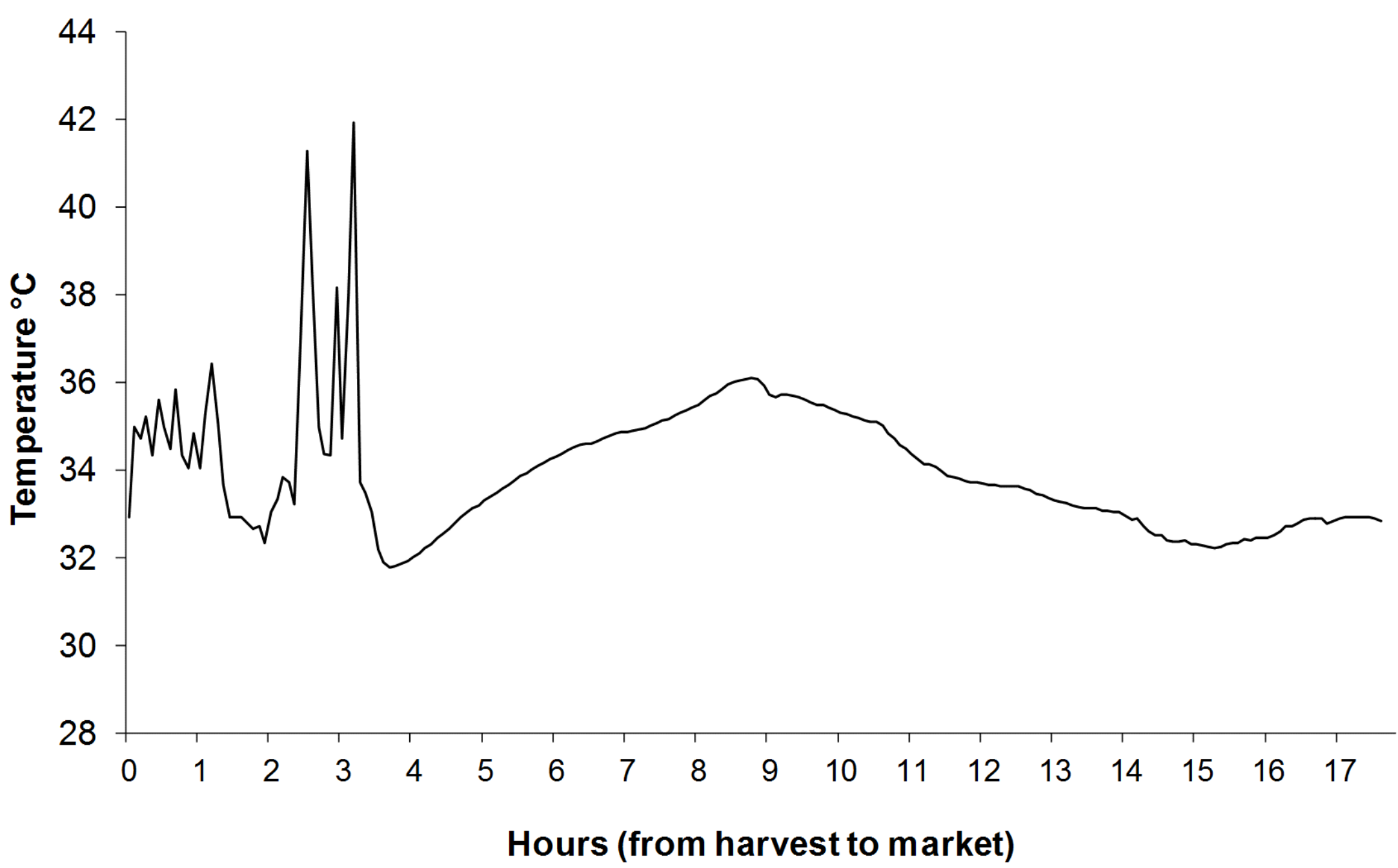


Figure 1. Temperature profile of bok choy supply chain from farm in Kandal Province to Samaki market, Siem Reap (Hour 0, 11:08 am 9 September 2015; Hour 18, 4:43 am 10 September 2015).

Proposed solutions

A plastic crate can provide better protection to vegetables in transit, relative to the commonly used plastic bags. Further, covering the crate of vegetables with a wet microfibre cloth (capable of absorbing more water than normal cloth) can protect vegetables from heat, reduce water loss and in turn maintain the quality and reduce postharvest loss (Figure 2).



Figure 2. Crate of harvested bok choy covered by a moist microfibre towel to reduce exposure to high temperatures and physical damage.

Improvement from preliminary trials

Preliminary trials have found that packing bok choy in a crate and covering with a moist microfibre towel can lower the temperature by 3 to 6°C relative to the commonly used plastic packing. At the end of an 18 hour simulation supply chain from Kandal Province to Siem Reap, the weight loss of a crate of bok choy was 1.4% less in the plastic crate compared to the plastic bag. The cost of a plastic crate and microfiber towel was approximately 18.7 KHR/kg more than the cost of the plastic bag packaging. However, revenue increases associated with reduced loss were measured at approximately 49 KHR/kg and thus cost increases were more than compensated for.



Australian Government
Australian Centre for
International Agricultural Research

Acknowledgements

This research was part of a project lead by The University of Adelaide, funded by the Australian Centre for International Agricultural Research (ACIAR) through project ASEM/2012/081 "Improving market engagement, postharvest management and productivity of Cambodian and Lao PDR vegetable industries".

More information

Visit our website
www.adelaide.edu.au/global-food/research/international-development/cambodia-laos-vegetables
Or contact Dr Vivian Ku, Email: vvjconsulting@gmail.com