Innovative Technologies for Reducing Postharvest Losses

Summary of Strategies Appropriate to the APEC Economies

U.S.-APEC Technical Assistance to Advance Regional Integration (US-ATAARI)

Introduction

- Infrastructure development of food markets and supply chains, including the use of public-private partnerships (PPPs), is a way to reduce postharvest losses in APEC economies.

- This report reviews technologies for reducing postharvest losses that are being tested or implemented globally and can be adapted and scaled up by APEC members.

Groups of action/intervention

1. Improving On-Farm Procedures
2. Controlling Temperature
3. Controlling Water Content
4. Controlling Quality
5. Improving Packing and Packaging
6. Improving Storage
7. Improving Transportation

1. Improving On-Farm Procedures

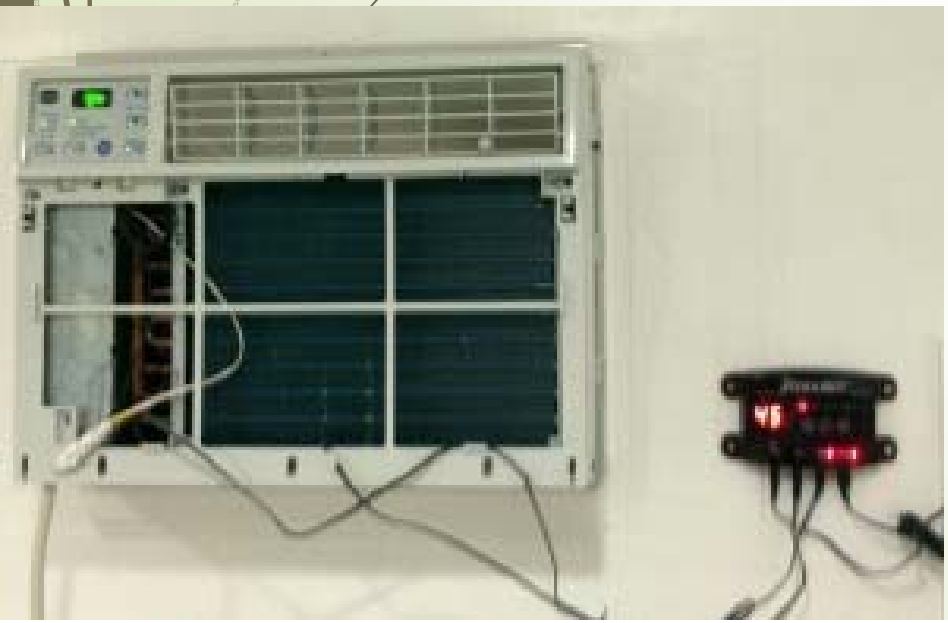
- Proper maturity assessment: immature or overmature plant products are generally discarded.
- Reduced stress and gentle handling of animals.
- Near infrared spectroscopy is promising for measuring internal characteristics of fruits.
- Proper manicure, cotton gloves, and sharp tools are important for reducing harvest damage.

Source: Panoramio.com

2. Controlling temperature

Case Study: The CoolBot

- It is a device that can be easily installed to operate window air conditioner units and transform it into a walk-in cooler at a lower price than the conventional manufactured cooler.



Pictures taken from:
http://wildfirefellowshipfarm.com/tag/coolbot/

2. Controlling temperature

- There are other systems for cooling that can be adapted depending on the local conditions such as refrigeration, ice, wind-powered turbines, water sprinkling or misting, underground storage, and others.

- Temperature monitoring is key to controlling postharvest losses. Electronic thermometers and hygrometers, radio frequency chips, and enzyme-based time/temperature labels (such as those marketed by Avery Corp.) are effective tools for monitoring temperature.

3. Controlling Water Content

- Loss of water affects texture, and accelerates loss of vitamins and other nutrients.
- Biodegradable plastics, *for example Biobags*,*can dramatically increase product quality.
- Reducing water content and keeping it low is equally critical for dry food products, especially grains and pulses.
- The main drying technologies used are: solar dryers, fuel-based dryers, osmosis, freeze drying and desiccant beads (zeolite).

**= http://biobagusa.com/products/retail-products/*

Case Study: Zeolite Drying Beads

- Zeolites are aluminum silicate minerals. Rhino Research, a company based in Thailand, developed the FlexiDry® system. It can be used as a fast and mobile way of drying seeds. The desired humidity can be set and risk of contamination is practically eliminated.

Source: http://www.rhino-research.com/download/DryingBeads.pdf

4. Controlling Quality

- Local markets informally determine standards and price of food products. On the other hand, international markets and selective consumers take standards as an essential tool for communication of value.

- Many innovations include weight sizers, diverging-rope sizers, diverging-roller sizers, high-speed cameras and even near-infrared technology that can detect external as well as internal traits of food products.

Case Study: The catalytic ethylene generator

- It uses ethanol dehydration to generate ethylene. This is a simple technology which is used in small ripening rooms in developed economies and could help overcome safety concerns for artificial fruit ripening in some developing economies.

Source: http://www.catalyticgenerators.com/products/easy-ripe-ethylene-generator/

5. Improving packing and packaging

- Reusable plastic crates offer many advantages for packaging perishables and some durables.
- Automated packing equipment is too costly for small and medium packing houses, therefore, these houses rely mostly on manual packing.
- For some products, pre-formed trays or cells can increase the speed and efficiency of manual packing.
- Robotic technologies have huge potential, and it is anticipated that the adoption of such technologies will continue to increase.

6. Improving storage

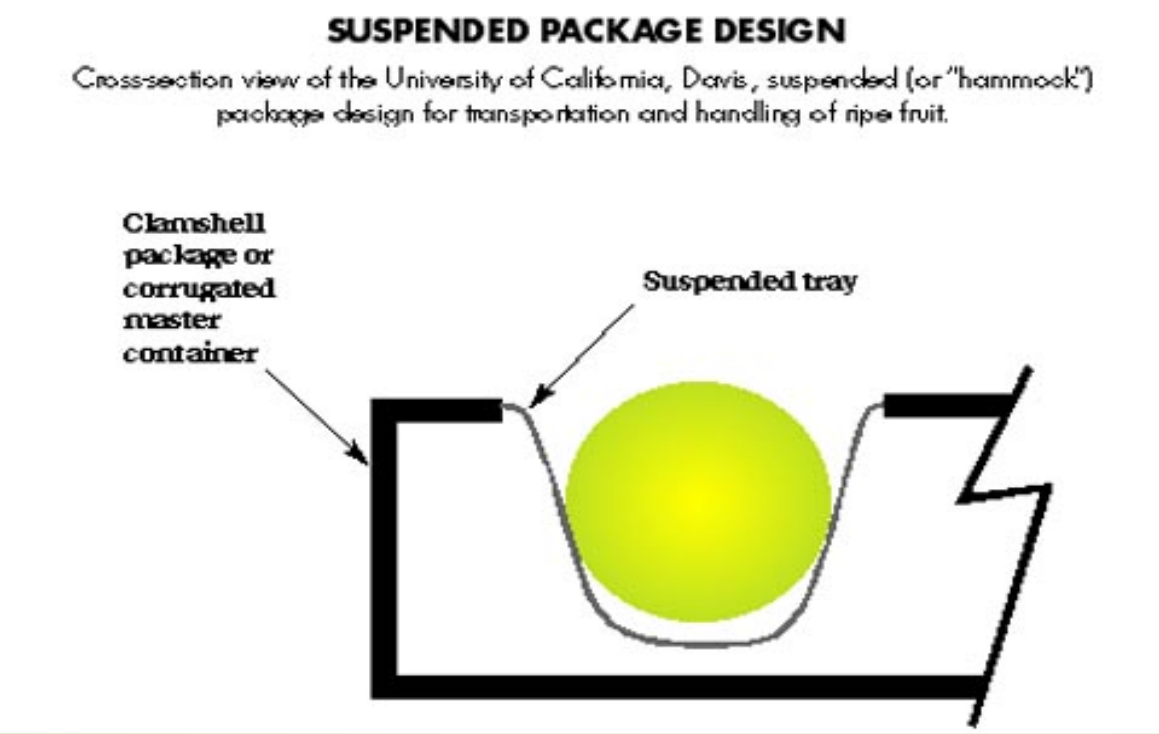
- The main reason to build a storage facility is to maintain the product quality, thus the initial product quality must be at the highest possible level.
- Thermal insulation typically with polystyrene or polyurethane foam walls.
- The efficient use of storage space with stackable crates or bins and a racking system .
- Controlled and modified atmosphere is useful to control ripening.
- Regular sanitation of storage facilities prevents foodborne illnesses.

7. Improving transportation

- Better roads reduce vibration damage and refrigerated trucks maintain products' quality.
- Cushioning to reduce vibration during transport is particularly important for specialty delicate products.

Case Study: Suspended-tray packaging

- An innovative packaging design. These trays are relatively expensive, but could be invaluable for export of delicate food products from developing APEC economies.



Source: http://www.goodfruit.com/research-new-packaging-developed-for-ripe-bartletts/

General Recommendations to APEC economies

- Implement methods of quantifying losses in the marketing chain.
- Institute an APEC framework of grades and standards for food products.
- Make improving cool chain infrastructure a major priority.
- Encourage local manufacture of structural insulated panels.
- Test and develop low-cost drying options.
- Encourage the use of standardized reusable plastic crates.
- Foster the development of marketing cooperatives and other organizations with the means to acquire transport vehicles and make them available to members.

Summary of Responses to the APEC Postharvest Loss Survey (1/3)

- A survey on a range of issues related to postharvest handling of fruits, vegetables, marine and freshwater fish, and dairy and meat products was circulated to APEC economies via the APEC Policy partnership on Food Security in 2015.

- The questions deal with issues related to the agricultural supply and value chains, focused on the 7 points of action/intervention to reduce postharvest losses previously presented .

- The goal of the survey was to enhance experience sharing of the use of new technologies among APEC economies, thus promoting the adoption of such technologies at critical points along the agricultural supply and value chains.

Summary of Responses to the APEC Postharvest Loss Survey (2/3)

- Representation in the survey was disappointing (responses from only 11 economies), and the quality of the responses was also less than desired.
- It seems probable that wider distribution would be needed to obtain the sort of information that the survey was intended to elicit.
- Responses for food systems (meat, fish) were provided by only one or two respondents, and there were no responses in relation to the dairy industry.

Summary of Responses to the APEC Postharvest Loss Survey (3/3)

- Vegetables (7) and fruits (5) received the largest feedback from economies.
- When the economies were asked about statistics for postharvest losses 4 for vegetables and 3 fruits had an estimate value of the losses which varies from 10 to 40% for different economies.
- Producers and marketers for foreign markets have adequate technology to maintain freshness of fruits/vegetables and their quality. On the other hand, producers for local markets often lack adequate cooling equipment, packaging and grading systems, and cushioning during transport, all of which leading to higher postharvest losses.

Thank you for your attention!