

Cold chain management – current status and scope in India

Vijay Yadav Tokala

President

The Postharvest Education Foundation,
La Pine, Oregon 97739, USA



Empowering people to reduce food losses...



Cold chain for horticulture produce



Chilling Injury symptoms in
Sweet orange ($<5^{\circ}\text{C}$)

- Temperature management is essential and effective at different steps of supply chain.
- Low temperatures decelerates physiological activities.
- Unlike meat, fruit and vegetables have a specific safe storage temperature range.
- Mango $\sim <9-12^{\circ}\text{C}$; Sweet Orange $\sim <2-5^{\circ}\text{C}$



Cold chain for horticulture produce

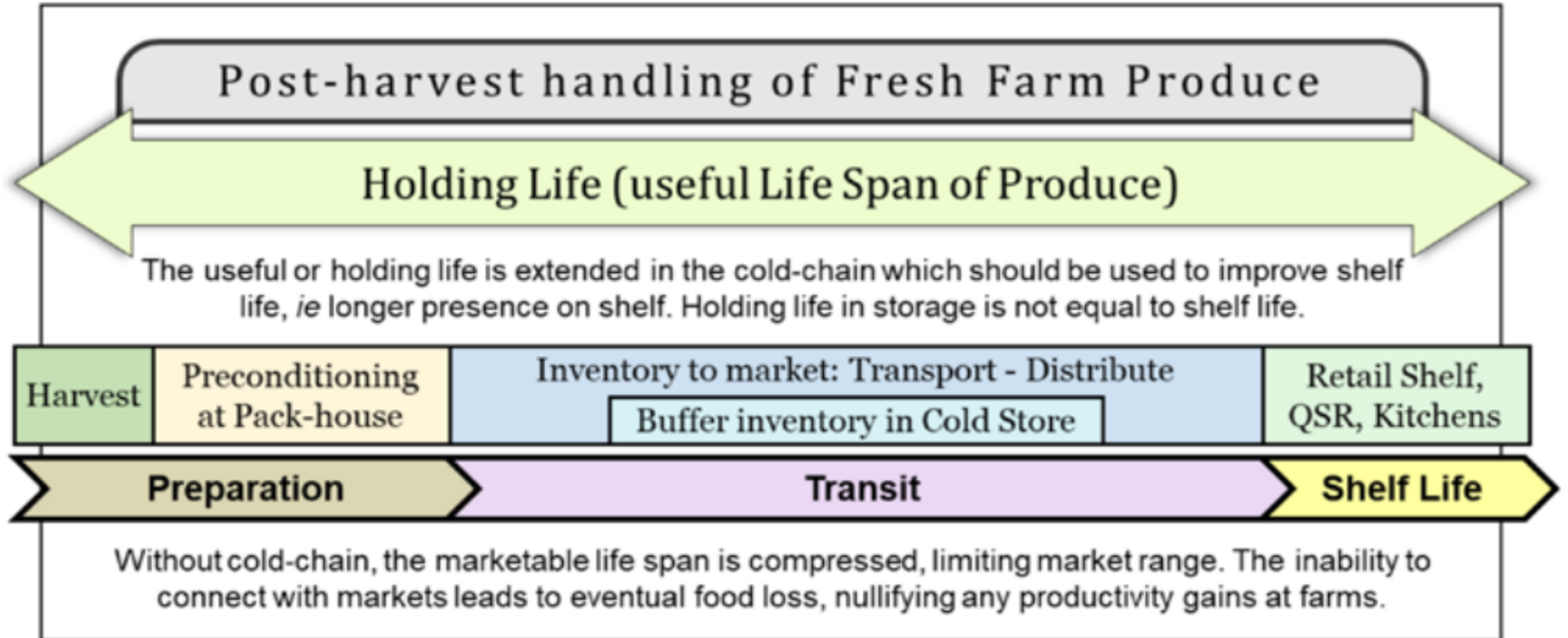


Figure 1. Holding life is not the same as shelf life (Source: Pawanexh Kohli)



Cold chain for horticulture produce

- Cold chain only extends holding life, but produce ultimately deteriorates.
- The extended holding life should be efficiently used to improve shelf life or marketing chances.
- Further extension of holding time – needs expensive technologies to offset perishability – may not economically feasible in small-scale agriculture.
- Proper cold chain management at every possible step of supply chain is most efficient way to reduce food losses.



Steps of cold chain

- Harvesting and Precooling
- Packhouse operations
- Processing
- Storage
- Transport and Market
- Household



Portable forced air cooling tunnel



Cold storage



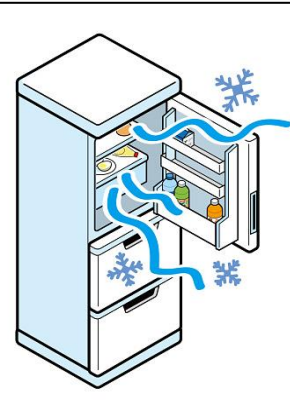
Processing



Reefer vans



Refrigerated retail display

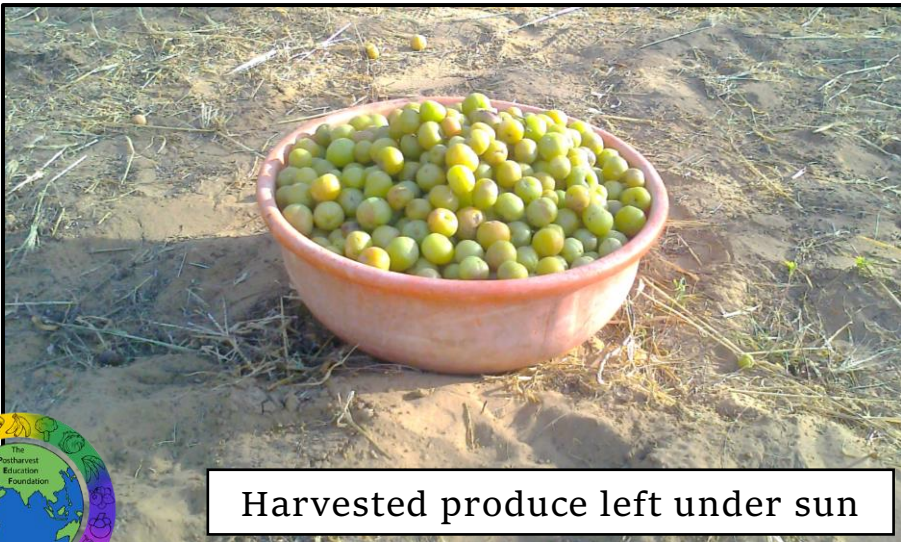


Refrigerator



Pre-cooling – status in India

- Most neglected practice and rarely practised.
- Reasons – lack of awareness, use of poor quality packages/containers and sometimes water scarcity.
- Scope: Create awareness about the importance and different ways to precool.



Tomato ready to get transported



Transportation – status in India

- Still in precarious stage – horticulture produce.
- ~9000 reefer vehicles out of 62,000 requirement (~85 % gap) (NCCD, 2015).



Reefer vans

- Reasons –
 - ✓ Mostly used to transport meat/fish.
 - ✓ Lack of proper roads.
 - ✓ Rail and Air transport – expensive.



Transportation – status in India

- Support: Government of India (GoI) through MIDH scheme provide 35% subsidy (credit-linked back-ended) on Refrigerated vehicles (up to INR 30 Lakh (~US\$ 42,000) – 9 to 15 MT capacity).
- Scope:
 - ✓ Huge scope for public-private partnerships to provide reefer vans/trucks/trains with proper specifications and ‘pay-to-cool’.
 - ✓ Reefer vans with different capacities and ability to change specifications easily.



Cold storage – status in India

- GoI in coordination with organisations such as MIDH, ICAR, APEDA, NABARD and allied ministries and departments providing financial support since 1999.
- >37.425 million MT capacity – largest temperature controlled space (Aug' 2020).
- Support:
 - ✓ MIDH – Credit linked back-ended 35-50% subsidy (5000- 10000 MT = INR 8000-10000 (US\$120-140)/MT).
 - ✓ Assistance will be available to individuals, Farmer groups/ Public-private partnership, SHGs, Farmers Producer Organization (FPOs), Companies, Corporations, Agricultural Produce Market Committees (APMC).



Cold storage – status in India

○ Limitations:

✓ Electricity supply.

✓ Lack of awareness on right cooling procedures – mixed loads, too cold temperatures, produce-specific requirements.

○ Scope:

✓ Third-party logistic services construct multi-chambered cold storage and offer pay-to-cool.

✓ More scope with small-capacity storage units that can store fruits separately from vegetables.





Cold storage/Ripening room



Multi-storied Cold storage



Mixed loads in cold rooms (Bakery foods, Dried chillies, Tamarind)



Cooling at retail



- Last link of cold-chain and often neglected.
- Limited to carbonated beverages, ice creams or expensive products.
- Mostly refrigeration done for high value, but not by understanding requirements of specific produce.



Cooling at Retail – Status in India

- Mostly displayed at ambient conditions.
- Moist jute bags/ water sprays are most common method at retail.
- Recent increase in retail sale of fruit and vegetables in supermarkets – refrigerated displays.

Scope:

- Training retailers/staff about appropriate temperature choice, packing as well as food safety issues.



Clean cold chain

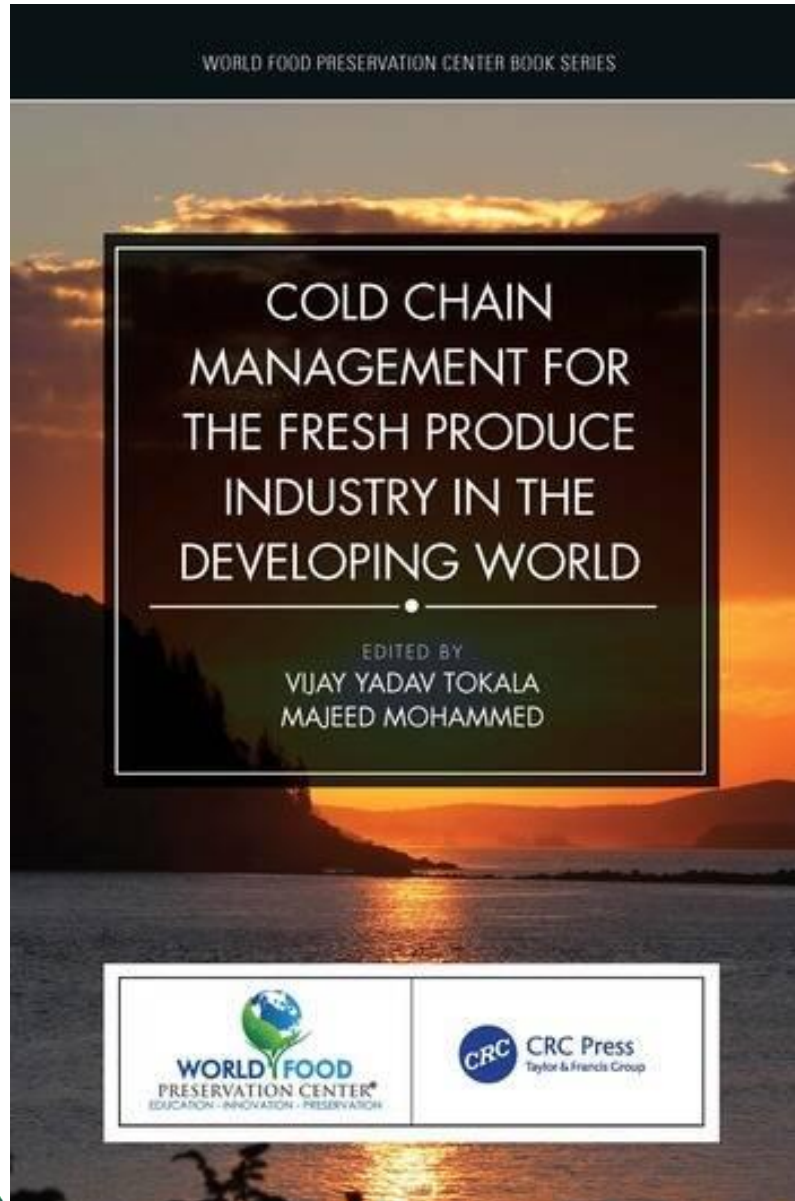
- “Today’s solution shouldn’t be tomorrow’s problem”
- Present day – mostly mechanical refrigeration systems.
- Stationary system – Electricity.
- Mobile system – Diesel or other fuels.
- Cooling – emits GHGs = shipping and aviation combined.
- Wide adoption of sustainable technologies and clean cold chain development needed.



Conclusions

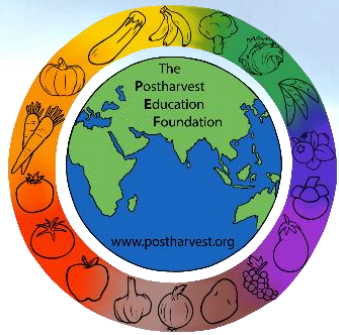
- Cold chain management enhances farmer income as well as ensures food security.
- Concept of cold chain is more than just cold storage but starts from farm and continues until the produce is consumed.
- Success of cold chain management is depends on how the extended holding time is efficiently used.
- Need for wide adoption of sustainable technologies and clean cold chain development.
- To reduce food losses, effective extension and training about factors affecting food loss and wastage and proper temperature management is essential.





- Case studies for promoting the expansion of existing technologies for cold chain development in Asian, Africa and the Caribbean nations.
- Assesses cold chain management as crucial to the growth of global trade in perishable products.
- Resilient, sustainable and creative concepts to develop cold chains to enhance food distribution





Thank You...!!!

