GLOBAL COLD CHAIN
ALLIANCE

Appropriate Postharvest Technologies to Start the Cold Chain

Richard Tracy, Director International Programs Manager

Objectives

- Introduction to GCCA and WFLO
- Overview of the a recent WFLO/GCCA activity in appropriate postharvest technology
- Details on Recommended Interventions
- Q & A

Who are we?


IARW
International
Association of
Refrigerated
Warehouses

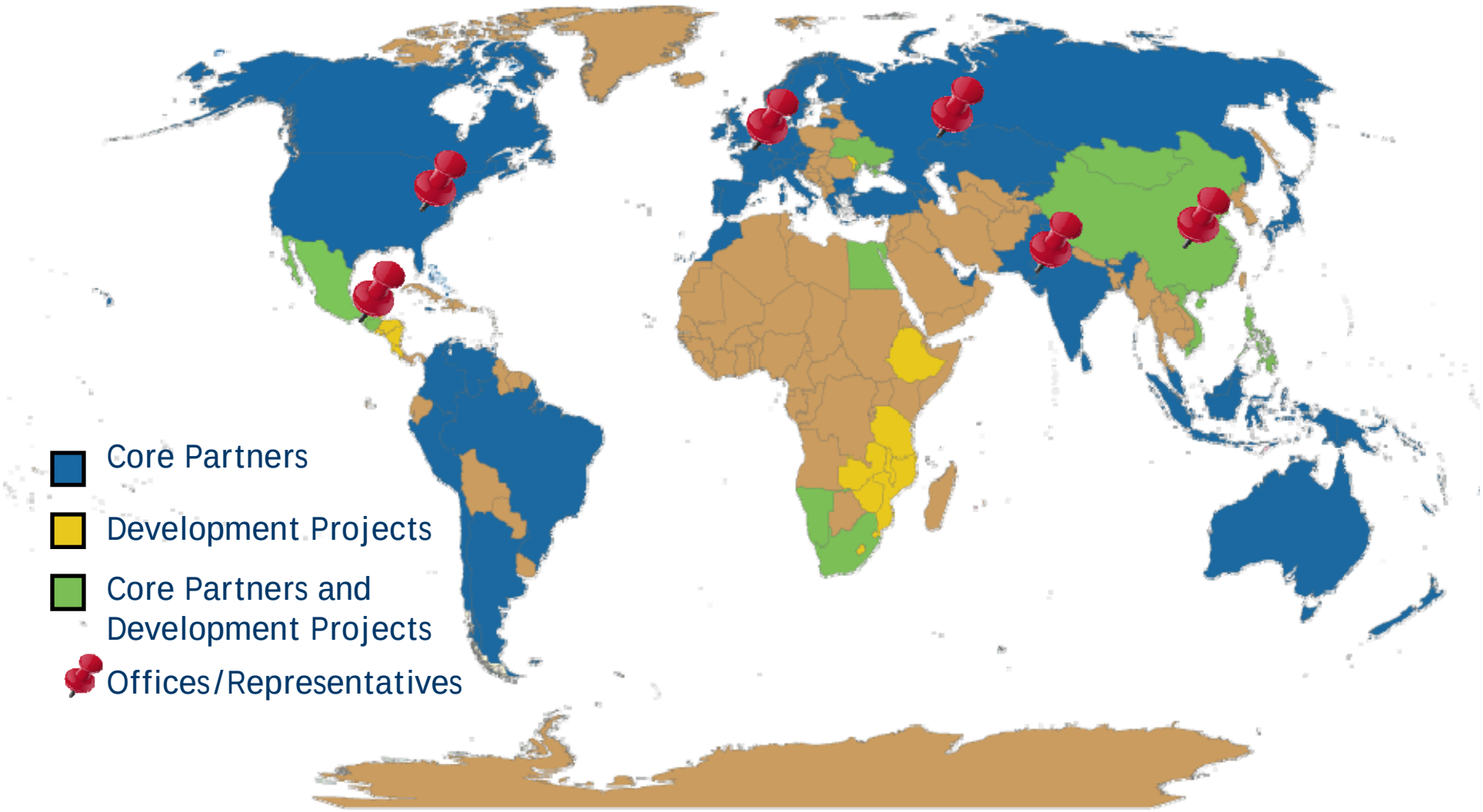

World Food
Logistics
Organization
WFLO
The Refrigeration
Research & Education
Foundation


iar
International Institute of
Ammonia Refrigeration


INTERNATIONAL REFRIGERATED
IRTA
TRANSPORTATION ASSOCIATION, INC.


International
Association for
Cold Storage
Construction

Where are we?


Core Partners
Development Projects
Core Partners and Development Projects
Offices/Representatives

What is the Cold Chain?

Post Harvest

Processing

Transport

Warehousing

Transport

Retail

What is the cold chain?

- The cold chain refers to the management of the temperature of perishable products in order to maintain quality and safety from the point of slaughter or harvest through the distribution chain to the final consumer.

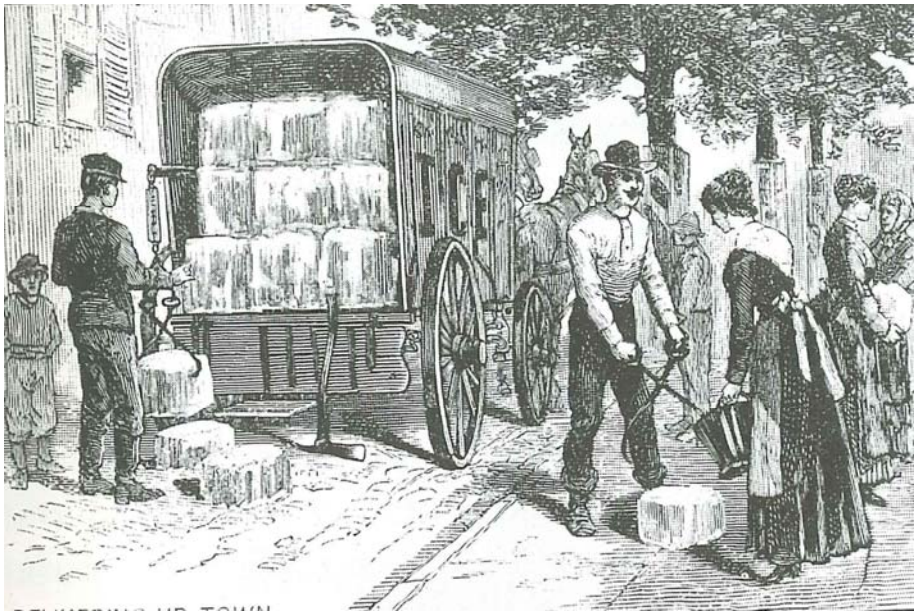
Why is the cold chain important?

- The cold chain ensures that perishable products are safe and of a pleasant quality at the point of consumption. Product quality leads to greater demand and the overall protection of public health.

Post Harvest

Processing

Transport



Warehousing

Modern Facilities

Retail

Details on Eight Recommended Interventions

Appropriate Postharvest Technology #1: Improved containers

The containers typically in use in Africa and South Asia are baskets, sacks and wooden crates.

Improved containers include:

- High quality plastic crates with proper venting, which are stackable, nest-able, easy to clean and reusable
- Fiberboard liners for locally made containers or plastic crates
- Smaller sized packages

Plastic crate (India)

Liners for plastic crates in India with better aligned vents

Collapsible plastic crates (5 folded crates equal the volume of one open crate)

Appropriate Postharvest Technology #2: Use of Shade

Shade can greatly reduce the temperature of any fresh produce that is being handled outdoors

<u>Shade can be provided by</u>

- Net, cloth or thatch structures
- Market umbrellas

Market umbrella (Ghana)

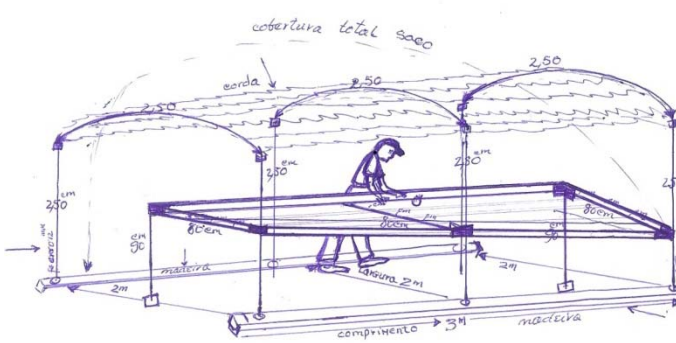
PolyNet shade structure (India)

Appropriate Postharvest Technology #3: Field packing systems

Field packing can often eliminate the need for a packinghouse, and can greatly improve the speed of postharvest handling, while reducing costs and waste.

Field packing station (Rwanda)

Field packing can include grading, trimming or wrapping before packing.
Field packing can be done:
In the row during harvesting
Under shade at the side of the field

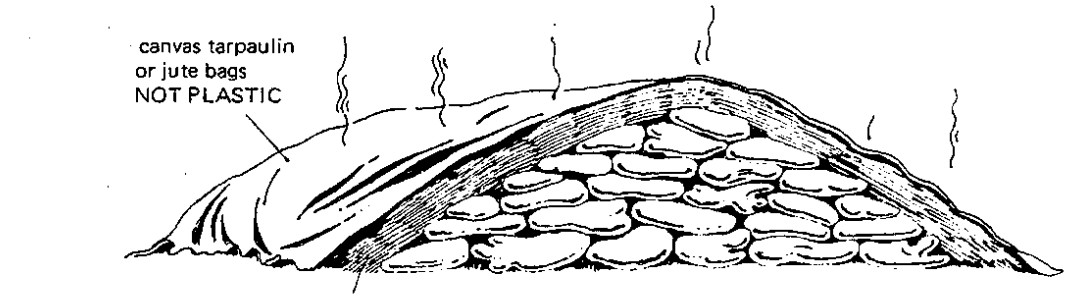


Design for field packing station in San Nicolau,Cape Verde (Agland, 2009)

Appropriate Postharvest Technology #4: Curing root and tuber crops, onions and garlic

Curing root and tuber crops such as sweet potatoes, potatoes, cassava and yams is an important practice if these crops are to be stored for any length of time. Field curing takes time (5 to 7 days) but costs little or nothing.

Cut-away view of yam curing



At least 6" (15 cm) depth of cut grass placed on top of yams.

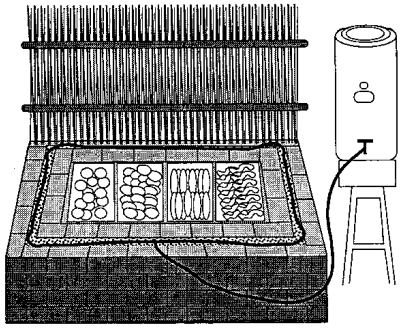
The best conditions for curing vary among crops:

Commodity	Temperature		Relative Humidity	Days
	° C	° F	(%)	
Potato	15-20	59-68	90-95	5-10
Sweetpotato	30-32	86-90	85-90	4-7
Yams	32-40	90-104	90-100	1-4
Cassava	30-40	86-104	90-95	2-5

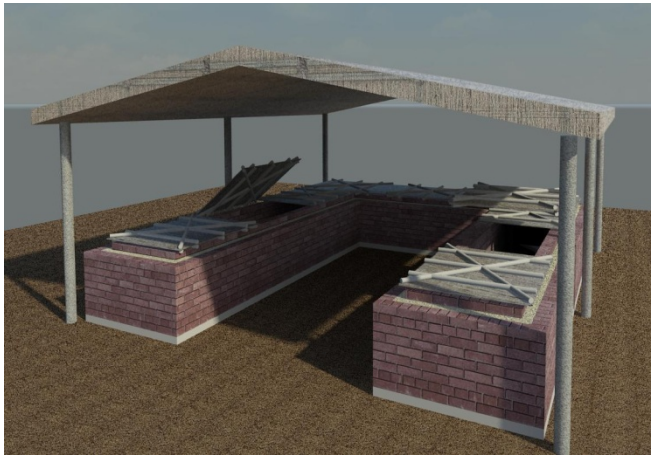
Field curing onions in Egypt

Appropriate Postharvest Technology #5: Low energy cool storage methods

- Refrigerated storage structures are relatively expensive to build and operate, and most small famers do not have
- access to these facilities. The low cost evaporative cooling chamber known as the "Zero energy cool chamber" or
- ZECC illustrated below is constructed from locally made clay bricks and sand in India.



100 kg size ZECC (India)



India design for Walk-along ZECC 1 MT capacity (APT project, 2009)

Visiting Manesar, India (April 2010)

Photo of a ZECC from Cambodia

Appropriate Postharvest Technology #6: Cold room with CoolBot unit

- An easily installed controller that prevents ice build-up but does not require modifying the control system of an
- inexpensive window style air conditioner (Cool-bot from Store It Cold, LLC, http://storeitcold.com)
- Costs about 90% less than the commercial refrigeration system

Room air conditioner controlled by CoolBot unit installed in a self-built insulated room.

Appropriate Postharvest Technology #7: Improved solar drying

Direct solar drying can result in quality problems and damage when produce overheats, gets wet or is contaminated by insects or other common pests.

Simple improvements such as raising the produce up off the ground and putting trays or mats on a platform, and using thin cloth to cover the trays or mats will have positive results at low cost.

Raised trays and cloth Cover for solar drying (Ghana)

Improved indirect solar dryer (Kenya)

Appropriate Postharvest Technology #8: Improved canning, bottling and pickling methods

There are many local and regional recipes and village level practices used for food processing in Sub-Saharan Africa and South Asia, but information on costs, nutritional value and food safety are often lacking.

Hands-on, practical training is a critically important part of any intervention

Key factors regarding promotion of selected postharvest interventions

Postharvest Technology	Crops that would benefit	Potential to scale up to many farmers?	How many might benefit?	Beneficial for women?	C/B analysis available?	Simple enough to repair; use by the next generation?	Key constraints?
Improved Containers: Plastic crates	All hort crops	yes	unlimited	yes	yes	yes	Need to develop systems for ownership, return, cleaning
Liners for existing crates	All	yes	unlimited	yes	yes	yes	Need designs to match local needs
Smaller packages	All	yes	unlimited	yes	yes	yes	Designs to match local needs
Field packing	Many F & V	yes	unlimited	yes	yes	yes	Training
Use of Shade	All	yes	unlimited	yes	yes	yes	Weather (wind)
Improved Curing	onions, garlic	yes	unlimited	yes	yes	yes	Training
Low energy cool storage: Brick/sand structures	All but onions, garlic	yes	unlimited	yes	yes	yes	Relatively high cost, needs financing, doesn't work well in humid or rainy weather
Small scale cold rooms with CoolBot	All	yes	unlimited	*	yes	requires repair services	Relatively high cost, needs financing, requires electricity, back-up generator
Improved Solar drying	Many F & V	yes	unlimited	yes	yes	yes	Training
Improved packaging for dried products	All	yes	unlimited	yes	yes	yes	Training
Improved canning, bottling or pickling practices	All	yes	unlimited	yes	yes	yes	Training
Notes	Grains and legumes also benefit from shade, improved packages	Easy to try on small scale before investing in larger or more units of the technology	Estimates of hort farmers in SS Africa & South Asia = 10 to 20% of all farmers	*Women's groups may be able to get financing for low cost PH investments	ROIs are positive, Pay back periods are quite short, can be weeks or months	Designs have few moving parts, are designed to be constructed locally	All these technologies would require support by local training activities for farmers, women's groups, small scale processors

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