



BMGF/WFLO Appropriate Postharvest Technology Project

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Objectives

- Overview of the a recent WFLO/GCCA activity in postharvest handling
- Q & A

Who are we?

International Association of Refrigerated Warehouses(IARW)

International Refrigerated Transportation Association (IRTA)

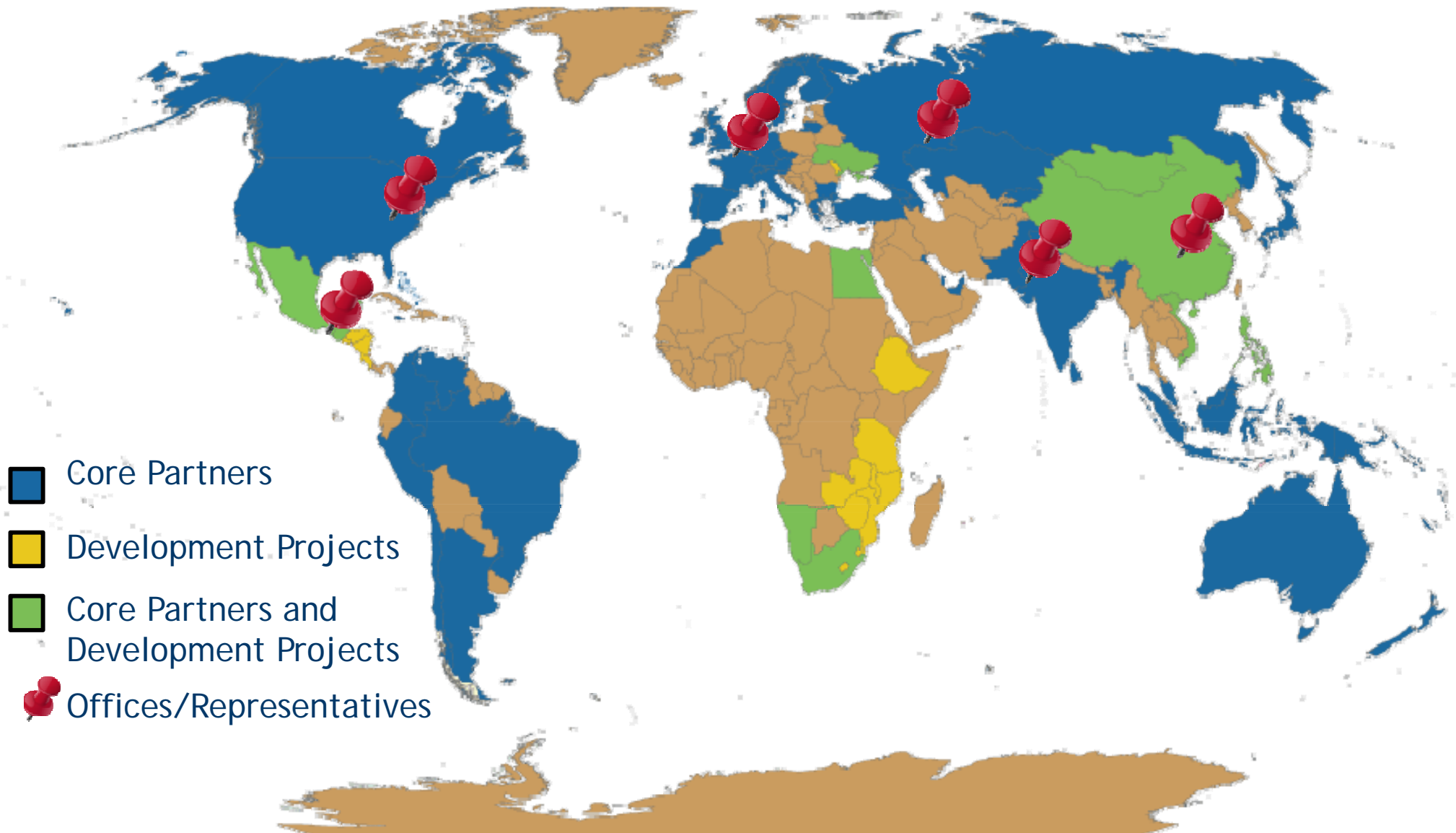
International Association for Cold Storage Construction (IACSC)

International Institute for Ammonia Refrigeration (IIAR)

And

The World Food Logistics Organization

Where are we?



Identification of Appropriate Postharvest Technologies for Improving Market Access and Incomes for Small Horticultural Farmers in Sub-Saharan Africa and South Asia

Grant Dates:

Feb 2009 – Jan 2010

Grant co-leaders:

Dr. Lisa Kitinoja (WFLO),

Dr. Marita Cantwell (UC Davis)

Objectives

- Establish a core team of 6 or more partner organizations in the US, Sub-Saharan Africa and South Asia
- Work together over 12 months to build local capacity in postharvest technology by training at least 30 people in loss assessment and Commodity Systems Assessment (CSA) methods
- Identify cost effective postharvest technologies that will reduce losses and improves incomes of smallholder farmers and marketers by 30% or more

Partners

US Partners

- WFLO
- UC Davis PTRIC

International Partners

- IITA (Benin)
- KNUST (Ghana)
- CSIR-CRI (Ghana)
- Ghana PolyTechnical Institutes (Bolgataga, Ho, Tamale and Wa).
- ISAR (Rwanda)
- KIST (Rwanda)
- Amity University (India)

Activity 1: Past Project Assessments

International Horticultural Development Projects included in our original proposal

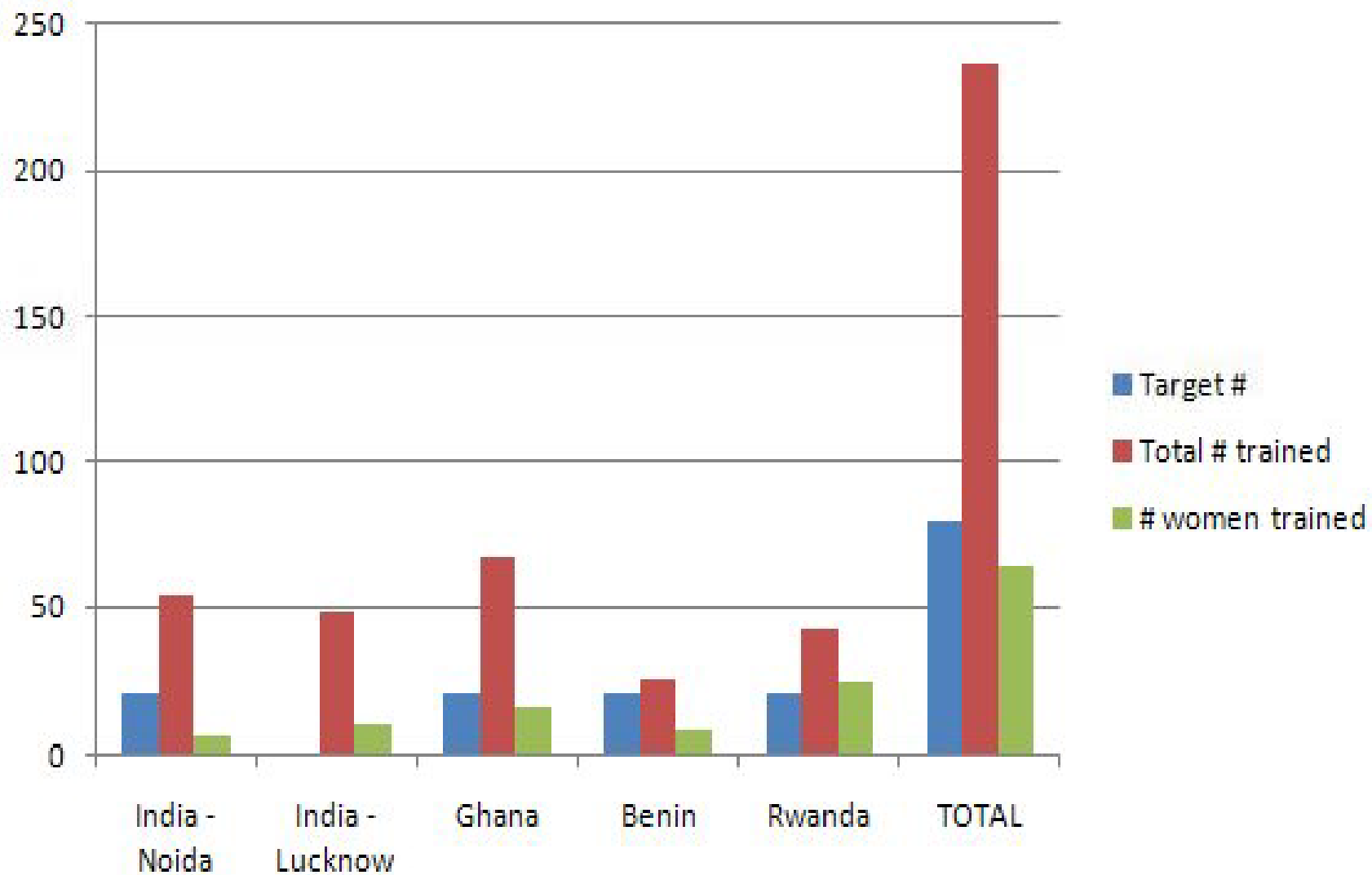
- 1) World Bank: Uttar Pradesh Diversified Agricultural Support Project (**UP DASP**)
- 2) USAID: Egypt Agricultural Technology Utilization and Transfer (**ATUT**) Project
- 3) USAID: Egypt Agricultural Exports and Rural Incomes – Enhancing the Livelihoods of Smallholder Horticultural Activities Managed Sustainably (**AERI EL SHAMS**) Project
- 4) USDA: United States-Ghana Consultative Committee on Agriculture and Rural Development (**CCARD**) Training and Analysis Assistance in Building Capacity Project.
- 5) USDA: **Indonesia Cold Chain Project**

Seven more Past Projects were added after the Literature Review

- 6) USAID: India Agricultural Commercialization and Enterprise Project (**ACE**)
- 7) USAID: India Growth and Microenterprise Development Project (**GMED**)
- 8) MCC: Ghana MiDA Agricultural Productivity Project (**MiDA APC**)
- 9) USAID: Indonesia AMARTA Project (**AMARTA**)
- 10) USAID: Kenya Hort Dev Project (**KHDP**)
- 11) JICA: Kenya HCDA Project (**HCDA**)
- 12) Rockefeller Foundation: Kenya Techno-serve **Banana Program**

Short and Long Term Outcomes

- Many simple technologies still in use on the farm, at the packinghouse, in the markets and during processing.
- Postharvest technologies included: use of harvest indices, improved packages, shade, sorting/grading, field packing, cooling practices, use of packinghouses, improved storage structures, small scale food processing methods (solar drying).
- Three of the completed projects (AERI, CCARD and HDCA), had very few measureable or sustainable **long term** impacts



Activity 2: Postharvest Training Workshops

Training Topics

- Postharvest loss assessment methods
- Quality assessment tools
- The use of Postharvest tools for measuring losses
- Data collection protocols, sites, interviewing methods
- Commodity Systems Assessment (CSA)
- Identification of research, training and advocacy needs

Activity 3: Measuring Postharvest physical losses

Based upon sorting (discarding of produce that is too damaged or decayed to sell)

1) Temperature

- The temperatures during harvest, handling, transport and marketing were **much higher** than those that are recommended for the produce for quality maintenance.
- The general **lack of the use of shade** contributes to high pulp temperatures and high water losses
- **Weight loss** in Rwanda for leafy greens (amaranth in sacks) was measured to be an average of 11% over a time period ranging from 30 to 240 minutes after harvest.

Postharvest Physical losses

2) Poor quality containers

- Packages were too big, too rough, too flimsy to provide protection and/or without adequate ventilation
- Produce is marketed in sacks, baskets, boxes or cartons with the damaged produce hidden in the bottom
- When a basket or sack of leafy greens was sorted in the wholesale markets in Benin, the level of mechanical damage was 89.5%



Enormous sacks of cabbage (Ghana)



Packed in Cloth bundle

Postharvest Physical Losses

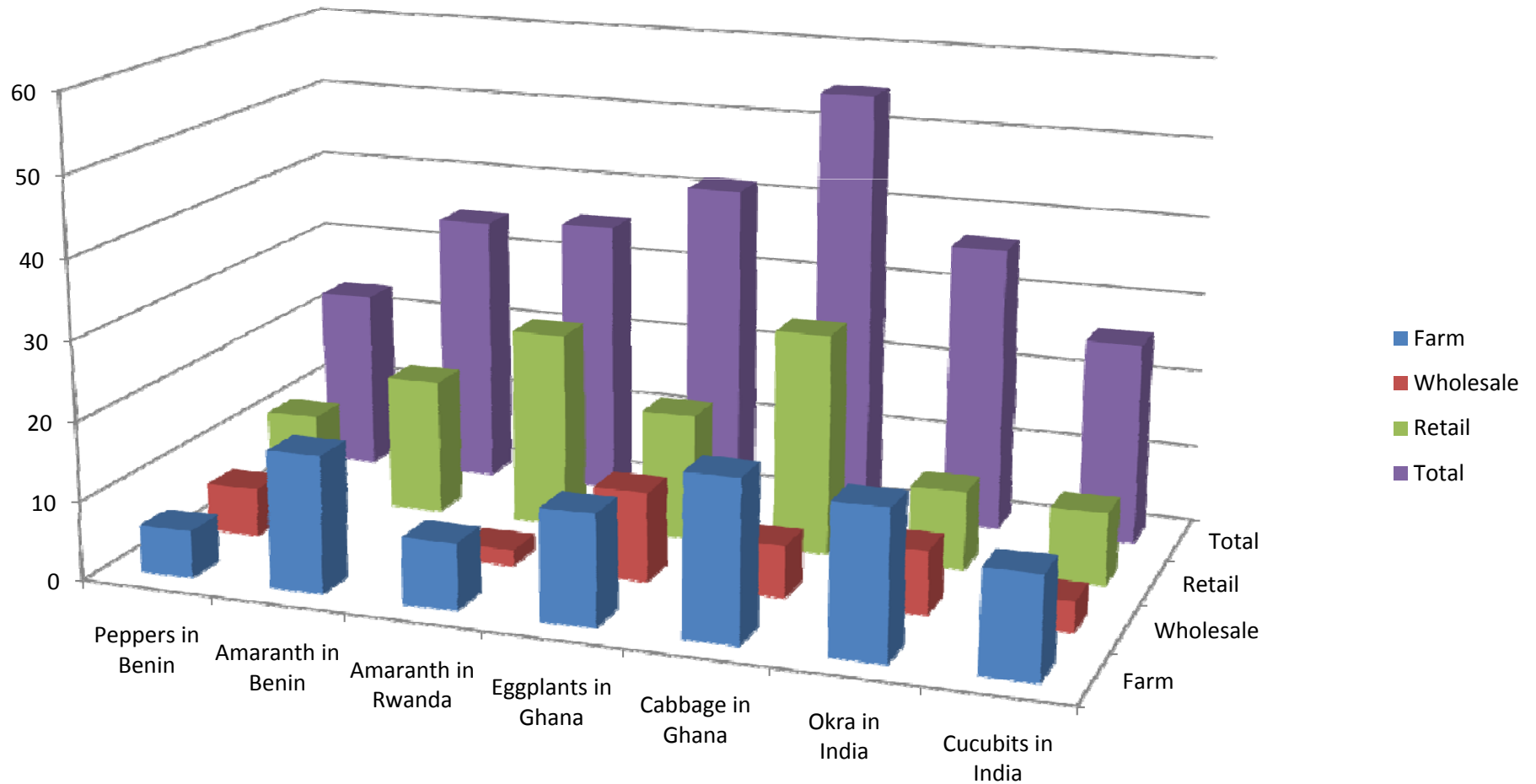
3) **Poor field sanitation**

- Promotes the spread of fungal and bacterial diseases and insect pests. For example, pre-sorting losses due to pest damage were very high for okra in India (18.5%) and for leafy greens in Benin (17.3%).

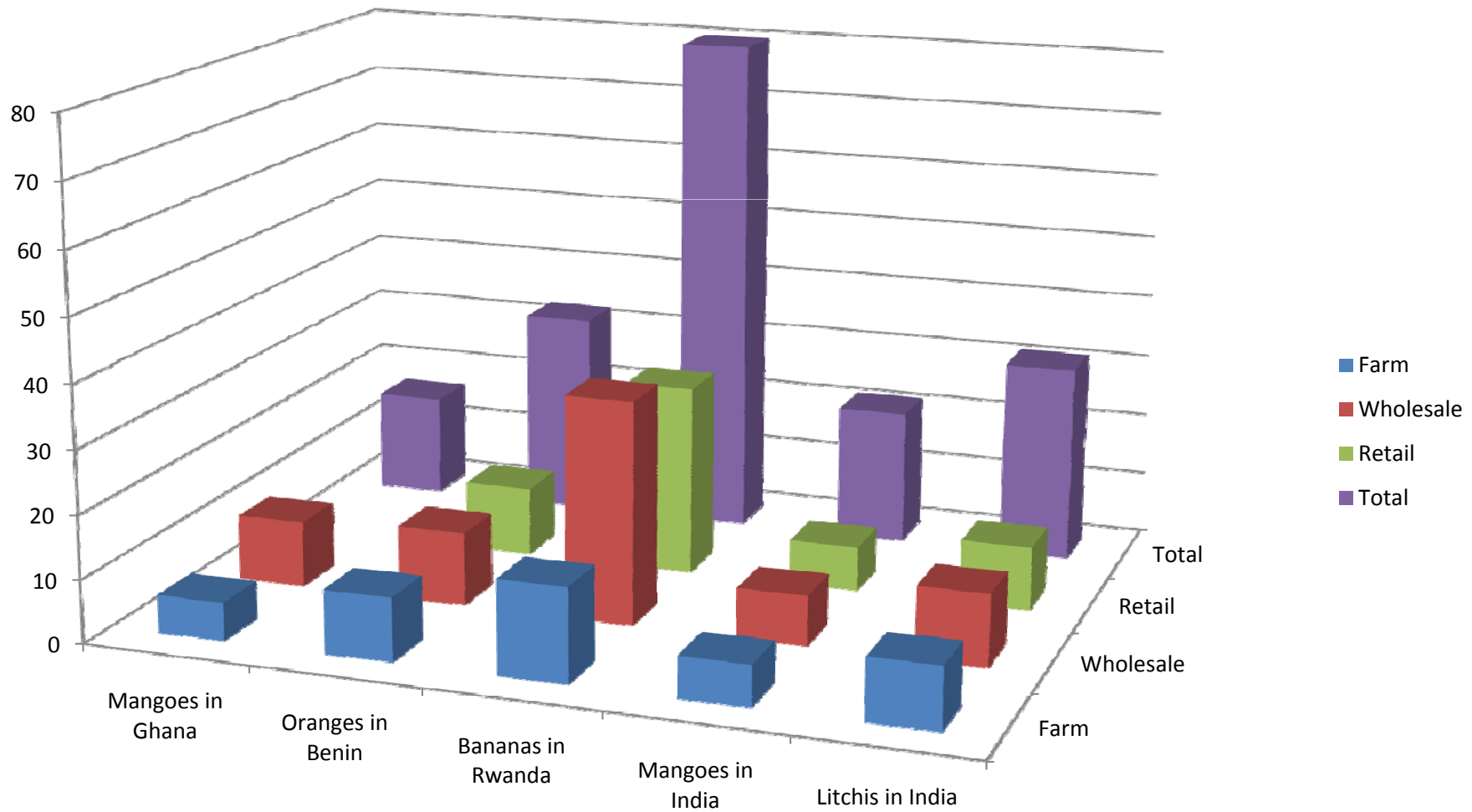
4) **Time**

- The time it takes to reach the retail market varies widely, but damage increases as the hours or days go by. In Benin, the average level of damage measured for produce being sold at the retail market was 76.5% for mangoes and 79% for leafy greens (amaranths and African eggplant leaves).

Postharvest losses: Vegetables



Postharvest losses: Fruits



Activity 4: Field trials of potential solutions

- Improved containers
- Field packing
- Use of shade
- Zero energy cool chambers or ZECCs
- CoolBot
- Improved canning/bottling methods

Costs and Expected Benefits

Overall, of the 21 C/B analyses we performed on six different categories of postharvest technologies, all 21 were found to be profitable for small farmers.

17 technology/crop combinations (81%) were found to provide an increase in income of 30% or more.

Assuming a baseline income of \$600 per year (or less than \$2 per day), potential profits were more than \$200 per year.

Sample Cost/Benefit Worksheet

Costs and Benefits of ZECC walk-along cool storage in India
 Assumptions: Each harvest = **1000 kg of mixed vegetables** during the hot season
 Consider only those variables that are different when comparing handling practices or technologies.

	Current Practice	New Practice
Describe postharvest technology and practices:	Vegetables must be sold on the day of harvest regardless of farm gate price or market price	Vegetables can be stored in the ZECC for a week to 10 days if needed before sale
COSTS		
Zero energy cool chamber walk-along model (1MT size ZECC)		\$1000
Containers (20 sacks)	\$10	
Reusable Plastic crates (50)		\$ 250
Relative cost	\$10	\$1250*
EXPECTED BENEFITS		
% losses	30%	10%
Amount for sale	700 kg	900 kg
Value/kg	\$1.00	\$1.20
Total market value of one load	\$700	\$1080
Market value – recurring costs	\$700 - \$10 = \$690	\$1080
Relative profit		+ \$390
Time required to repay the investment		\$1250 / \$390 = 3.2 The investment pays for itself in about one month (3.2 uses) if used at full capacity.
Return on Investment (ROI)		Each subsequent 1MT load provides a \$390 premium compared to the traditional practice.

Oral and written reports

- 1) Final report for the BMGF
- 2) Review article on postharvest losses in developing countries (journal article)
- 3) Review article on past postharvest projects and lessons learned for future development efforts (journal article)
- 4) Annotated bibliographies of references used for this project (web-based pdf files)
 - Annotated bibliography #1: Postharvest Losses in Developing Countries
 - Annotated bibliography #2: Horticultural Development
 - Annotated bibliography #3: Poverty Reduction Strategies
- 5) Scientific article on 2009 postharvest loss assessments of key horticultural crops in India, Rwanda, Ghana and Benin (journal article)
- 6) Slide Deck on Final Report for BMGF (to be published on Market Access website)
- 7) Invited presentation at the Postharvest Symposium at the 28th International Horticultural Congress (August 2010, Lisbon, Portugal)

WFLO Planning Workshop

- Held at UC Davis
- 10-12 November 2009
- Generated ideas and Concept papers
- Next step– to develop Proposals for future large scale Postharvest Horticultural Development Projects



Concept Papers in development

1) Sub-Saharan Africa

DAI, UCD, WFLO will work with IITA, AVRDC and local African institutions on a capacity building proposal

2) South Asia

ACDI/VOCA, UCD, WFLO will work with Amity Univ, BARI, NARI, Sri Jayewardenepura University (Sri Lanka)

Future WFLO involvement

Draw on members who want to become involved in

- Assessments, Technical Assistance, Training
- Postharvest handling, storage, transport of hort crops for small-holder farmers and marketers
- Food processing methods for village level
- Designs for Packinghouses, small scale cold storage, improved transport options
- Mentors for young professionals, engineers, researchers, extension workers

Contact Information

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