Preventing Post-harvest Losses from Field to Market: A Food Security Imperative

Speakers
Robert Bertram, USAID/BFS
John Bowman, USAID/BFS
Philippe Villers, GrainPro
Steve Sonka, University of Illinois

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Bob Rabatsky, Fintrac

Facilitator
Zachary Baquet, USAID/BFS

March 27, 2013
Upcoming Agrilinks Events:

- Ag Sector Council | April 24 | IFDC
Join Learning Lab

Learning Lab is a collaborative space where USAID staff and partners jointly create, share, refine and apply practical approaches in order to ground our programs in evidence and adapt quickly... Expand ▼

USAID’s Bureau for Policy, Planning and Learning presents a

Discovery Report on Learning in USAID/Washington

Library resource

Discovery Report

Creating a culture of learning involves changing the way staff conducts its work. To gain a better sense of how learning is already happening, USAID recently completed an in-depth study on the state of learning in the Agency’s Bureaus and Offices.

LEARN MORE ▶
Robert Bertram
USAID BFS

Dr. Bertram is Director of USAID’s Office of Agriculture Research and Transformation, where he works on building stronger research ties between the US community, the international centers, and partners in Europe and Japan. Dr. Bertram comes from a plant breeding and genetics background, with degrees from UC Davis, the University of Minnesota and the University of Maryland. Dr. Bertram served on the CGIAR Genetic Resources Policy Committee, as a technical advisor to the International Treaty on Plant Genetic Resources and chaired the FAO Commission on Genetic Resources for Food and Agriculture from 2002 to 2004.
John Bowman
USAID BFS

John Bowman is a Senior Agriculture Advisor at BFS and manages global projects for USAID’s Office of Agricultural Research and Policy in the areas of horticulture, integrated pest management, food safety, and post-harvest loss. Dr. Bowman has over 28 years of experience in international development having worked in over 40 countries for international agricultural research centers, multinational food companies, and international consulting firms. He holds two Master’s degrees (Latin American Studies, Plant Pathology) from the University of Wisconsin-Madison, and a Ph.D. in Plant Pathology from the University of Illinois-Urbana Champaign.
Steve Sonka
University of Illinois

Steven T. Sonka is Director of the ADM Institute for the Prevention of Postharvest Loss at the University of Illinois and emeritus professor of agricultural management. He was the first faculty member to hold the Soybean Industry Chair in Agricultural Strategy, served as the Vice Chancellor for Public Engagement and as the first Director of the National Soybean Research Laboratory. Dr. Sonka received a Bachelor's degree (1970, with distinction) and a Ph.D. degree (1974) in economics from Iowa State University. He has authored or coauthored over 220 books, articles and publications.
Philipe Villers is the President of GrainPro, a 'not-only-for-profit' company making hermetically-sealed, organic grain-storage systems to dramatically reduce grain losses in developing countries without the use of pesticides. Prior to GrainPro, he has been the founder of several companies, including: Cognition Inc. (1985-88), Automatix Inc. (1980-86), and Computervision Inc. (1969-1980). He holds an AB (with honors) from Harvard, an MS in Mechanical Engineering from M.I.T., and a Doctorate of Humane Letters (hon.) from the University of Lowell.
Bob Rabatsky
Fintrac

Bob Rabatsky is the Director of Feed the Future Partnering for Innovation. He has more than 25 years of experience designing, managing, and evaluating USAID and multilateral economic development programs. Prior to working on Partnering for Innovation, Bob was senior vice president of Fintrac, Inc. for more than a decade. He began his consulting career with Management Systems International where he conducted program evaluation assignments in Africa and as Controller. Bob began his career as an agriculture teacher in the Democratic Republic of Congo for the Peace Corps. Bob is an agronomist and agribusiness specialist with an MBA in finance.
The Role of Post-Harvest Loss in USAID’s Feed the Future Initiative

John E. Bowman, Ph.D.

Senior Agriculture Advisor
Office of Agricultural Research and Policy
Bureau for Food Security

Ag Sector Council

March 27, 2013
1. Current Issues

2. Overview of Major PHL Activities

3. Integrated PH Case Study
CURRENT ISSUES

1. Does FTF have enough PHL coverage?

2. Why the traditional focus on productivity?

3. Balance between stand alone PHL projects, and PHL projects as small components of broader value chain or research programs?

4. More analysis on barriers to PHL success – why has progress been so slow when solutions are relatively simple?
Feed the Future

- Announced in 2009 at G-8 Summit in L’Aquila, Italy, with $3.5 B investment
- Presidential Initiative addressing root causes of poverty, hunger, undernutrition
- Food security through staples, horticulture and livestock – must have nutritional outcomes; but....
- Where is PHL focus?? Failure to break away from the “wonder” of Green Revolution “front-end” productivity gains: breeding for yield, disease resistance, lodging resistance, fertilizer management, farming systems,
- New push for “sustainable intensification” also has a “front-end”
FTF Focal Areas in PHL

• Approaches and technologies for the “Small holder farmer”

• Agricultural Productivity - Improved techniques and technologies for farmers and producer organizations to become better managers of stored grains and other food products

• Expansion of Markets and Trade - Focus on PH market infrastructure for competitiveness in local and regional markets (granaries, cold storages, feeder roads, processing facilities, etc.)

• Economic Resilience for Vulnerable Communities – Storage and food preservation approaches so that communities can better withstand the shocks of unpredictable weather, catastrophes, violent swings in food prices
Challenge: Sustainably increase production and consumption of highly nutritious foods and diversify diets

- Fruits and vegetables provide critical micronutrients for child development
- One third of children under five in low income countries are stunted
- Half of all children and pregnant women are anemic

Solutions:
- Nutrition research on behavior, food utilization and household dynamics
- Research on production/consumption biofortified and nutrient-rich crops
- Develop options to strengthen post harvest handling safety
- Invest in nutrition, horticulture, animal sourced foods

Example Projects:
- Meat, Milk & Fish and Nutrition CRPs
- Horticulture, Livestock, AquaFish & Nutrition
“Stand Alone” PHL Projects Under FTF

1. Rwanda Mission - “Post Harvest Handling and Storage Program”

2. Tanzania Mission – “Tuboroshe” Food Fortification Project

3. Ghana Mission – Grain warehouse mgmt project w/AGRA

4. Mission programs in aflatoxin mitigation (Nigeria, Zambia, Mozambique, Malawi, etc…)

5. ARP – AVRDC PH Program for Vegetable Research

6. ARP – New PH Research Grant

7. ARP – Aflatoxin research grant to USDA/ARS

8. MPI – PPP with BMGF/Meridian comparing HH grain storage structures in Kenya (AflaStop)
Rwanda PHHS Program (Carana/ACDI)

1. “Sell for More “ PH training modules reach over 30,000 farmers (PHH, storage, operations, leadership, records keeping, marketing, credit access)

2. Worked with GOR to approve a “National PH strategy”

3. Cost-shared construction and rehab of over 11 maize storage facilities ranging from 100-800MT.

4. Brokered MOUs with WFP and MOA for sale of high quality, improved stored grain from targeted farmers

5. Piloted a SMS system linking over 100 grain cooperatives to buyers
“Partial” PHL Mission Projects Under FTF

EA Regional Mission – COMPETE and MLI Projects used warehouse receipts model to link farmers to P4P sales

Tanzania Mission – SAGCOT Corridor investments in rice granaries and cold storage facilities

Ghana Mission – ADVANCE project reduces PHL through an investment fund

Bangladesh Mission – CIP-led horticulture initiative has potato storage component led by Hort IL
“Partial” PHL Research Projects Under FTF

**Horticulture IL** – development and transfer of “CoolBot”; seed drying beads; advanced solar driers; e-learning and PH center in Tanzania

**DGP IL** – triple bagging technology in cowpea; solarization drying method for legumes

**Intsormil** – promoting use of threshing tarps and mechanical dyers in sorghum/millet

**CIMMYT** - simple, economical galvanized steel containers for household grain storage (Afr/LAC)

**IRRI** – has PH engineering unit which produces prototype equipment such as small gas-fired grain driers; bubble drying tunnels; moisture meters; etc...

**AVRDC** – breeding for PH quality (bruising, brix, disease, lycopene content); nutrient analysis under PH stress; preservation techniques and recipe formulations
Charcoal Coolers – Zanzibar

Such coolers are useful as the first part of a cold chain, i.e. the produce will go to a cold truck or fridge. They can take out the field heat in the field, which can reduce the load on subsequent coolers easier.
Correct Curing

Onions well cured can store much longer giving access to higher priced markets. Training is given for correct field conditioning.

Curing of vanilla is part of a partnership with TAPP/USAID/Fintrac and Kilimanjaro vanilla farmers.
Tomato varieties ‘Tanya’, ‘Tengeru-97’, ‘Kiboko’, ‘Tengeru 2010’ and ‘Duluti’ – disease resistant, more even ripening but also with thicker, stronger skins that make the tomato fruits better able to withstand transportation to market without bruising.

+ 40% increase in production and incomes in Tanzania
AVRDC – PH quality issues

Abiotic and biotic stress tolerance, selection for Brix values (sugar) and lycopene content for paste and sauce production – activities often done in partnership with private sector producers and processors.

AVTO1006
Ty-2+Ty-3

AVTO1008
Ty-2+Ty-3
Solar-Powered Coolrooms for Small-Scale Farmers

Horticulture CRSP testing the ‘Cool-bot’, which creates a small-scale cooler out of a well-insulated room, standard air conditioner, electronic modulator, solar panels
HORT CRSP – COLUMNAR SOLAR DRYER
Greenhouse dryer - Bubble dryer
South Sumatra, from 0 in 2005 to several hundred in 2012

Myanmar, from 1 in 2006 to 400+ in 2012

Driven by the private sector – key to sustainability
IRRI PH Model and PH Products

Combine harvesting

Flat bed dryer

Hermetic storage and granary improvements

Laser Leveling

Rice husk furnace

Quality tools

PIPA
Participatory Impact Pathway Analysis

PLA
Postharvest Learning Alliances
To embrace multiple stakeholders

Business models
For using PH equipment
For supplying PH equipment
Indigenous vegetables: A success story from East Africa
Integrated PH Project for AIVs

1. Breeding Improved Varieties – AVRDC
2. Linkage to Seed Companies – AVRDC, KHCP (Fintrac), TAPP (Fintrac)
3. Agronomic Improvement – AVRDC, Hort IL (Purdue)
4. Expt Station Demo trials - AVRDC
5. Field Demo Trials – KHCP, TAPP
6. PH Drying Techniques – Hort IL, MACE Foods
7. PH Packaging Techniques – MACE, KHDC
8. Local Markets/Nutrition Education – Hort IL
9. Export Markets – MACE, KHCP
10. Linkage to Vulnerable Groups – Hort IL, AMPATH (Indiana)
Working with multiple small seed companies in East and West Africa
AIVS: Low yield small farmer production
AIVS: High yielding intensive production on station (AVRDC)
AIVS: High yielding intensive production on farm with vulnerable groups (Hort IL, KHCP, AMPATH)
AIVS: Uptake from AVRDC by Dutch Seed company in Tanzania
AIVS: Recipe formulation and nutrient analysis (AVRDC, Hort IL)
AIVS: Dehydration of indigenous amaranths for export (MACE Foods, Hort IL)
AIVs: Export to Europe: (KHDP, MACE Foods)
“Asante sana”/ “Cam on”/ Thank you!
(www.feedthefuture.gov)
ADM Institute’s Approach for Postharvest Loss Prevention

Steve Sonka, Director
USAID Ag Sector Council Seminar
March 27, 2013

ADM Institute for the Prevention of Postharvest Loss
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN
Introductory topics

- The complexity of postharvest loss
- Timeline of the ADM Institute
- Evidence portal initiative
Why Reduce Post-harvest Loss?

Some *Hypotheses*

- Estimates suggest 1/3 of agricultural production is “wasted” and doesn’t reach food consumer

- Investment required to reduce PHL could be modest

- Technology advances should make reduction more feasible and less expensive

- Arable land, water, energy is in limited supply – reducing PHL can lessen pressure on scarce resources
Estimated postharvest loss of black gram in India

- Maharashtra: 22.68%
- Madhya Pradesh: 25.28%

PHL Varies Between States Within One Country (ADM Institute; 2012)
In SE Asia, physical losses range from 15-25%.

Quality losses range from 10-30% (loss in value)
Timeline of the ADM Institute

2011

Official Announcement

• $10 million gift
• India/Brazil emphasis
• Staple crops
Vision Statement

Key elements include:

• To be an international information and technology hub

• To encompass technologies, practices and systems

• To focus on staple crops in key agricultural domains
Timeline of the ADM Institute

2011
- Official Announcement
  - $10 million gift
  - India/Brazil emphasis
  - Staple crops

2012
- Awareness & Collaboration
  - $2.5 million in funding allocated
Four Themes

Measurement & Technology Development

Systems Informatics & Analysis

Policy Analysis

Education, Training & Information Transfer
Timeline of the ADM Institute

2011
Official Announcement
• $10 million gift
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2012
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2013
Innovation in Measurement
Innovation in Measurement

What to Measure
- Actual loss in specific local settings
- Interventions to reduce loss
- Effectiveness of interventions over time

How to Measure
- Resource and time intensive
- Applying information and communication technology
- Developing creative methods
- Incorporating the input and expertise of farmers and managers on-the-ground
Evidence Portal

- What is an evidence portal? An online resource
  - Providing easy access to published research and
  - Evidence-based guidance

- Why establishing evidence portal is essential for postharvest loss prevention?
  - Available information is fragmented.
  - Various methods are used for PHL measurement.

- Establishing an evidence portal for postharvest loss prevention is a major focus for the ADM Institute in 2013.
Email: ssonka@illinois.edu
Website: http://postharvestinstitute.illinois.edu
Improving Food Security

“Advances in Safe Storage & Drying for the Developing World”

USAID Bureau for Food Security
Ag Sector Council Seminar
March 27, 2013

presented by Philippe Villers
President, GrainPro Inc.

“A Green, Not Only For Profit Company”
“The Green Revolution, Phase II, the Storage Revolution”

At the heart of improving post harvest drying & storage for a hungry and poverty-troubled world, is the widespread application of...

*Simple* *Affordable* *Modern* Technology

“A Green, Not Only For Profit Company”
the World Bank Report
“Missing Food: The Case of Post Harvest Grain Losses in Sub-Saharan Africa – 2011”

Maize Losses 20–25%

“A Green, Not Only For Profit Company”
Indian meal moth
Life cycle 30-60 days
30-200 eggs/lifetime

30 °C = 86 °F

Typical Insect Density vs Temperature

30 °C = 86 °F

Centigrade

Insects

“A Green, Not Only For Profit Company”
Aflatoxin Producing Molds

To protect consumers, often restricted to <10 PPB

“A Green, Not Only For Profit Company”
In 2010, 10% of the Kenya maize crop had to be destroyed because of excessive aflatoxin levels.
Research on Aflatoxins (AF)

~Dr. J.H. Williams, University of Georgia

An estimated 4.5 billion people in developing countries are at risk of uncontrolled, or poorly controlled exposure to AF.

*Up to 40% commodities in local African markets exceed allowable levels of aflatoxins for foods.*

A cross sectional study in Ghana shows that *immune systems of HIV infected people are significantly modified if they have above median levels of natural exposure to AF.*

People with a high AF biomarker status in The Gambia and Ghana were more likely to have active Malaria.
Aflatoxin Levels

Monthly aflatoxin concentration with time in maize grains stored under different storage facilities

Source: Millenium Village Report, February 2013, Ruhiira, Uganda
What is Airtight Hermetic Storage?
A Modern “Green” solution to Safe Storage

- Low O2 / high CO2 environment
  kills living insects without pesticides

- Gas-tight storage Facility (1-2% Oxygen)
  (to all too common 25% losses!)

- Prevents growth of mold producing aflatoxins
  (decreasing vulnerability to cancer & HIV)

- Prevents increase in Free Fatty Acids (FFAs)

- Moisture level remains constant

“A Green, Not Only For Profit Company”
GrainPro’s Hermetic Storage Today
...in 87 Countries

Afghanistan, Angola, Australia, Bangladesh, Belgium, Benin, Bolivia, Botswana, Brazil, Burkina Faso, Cambodia, Cameroon, Canada, Chad, China, Cyprus, Colombia, Costa Rica, Denmark, Dominican Republic, Ecuador, El Salvador, Eritrea, Ethiopia, France, Gabon, Gambia, Ghana, Guatemala, Guinea Bissau, Hawaii, Honduras, India, Indonesia, Israel, India, Italy, Ivory Coast, Jamaica, Japan, Kenya, Laos, Lesotho, Madagascar, Malawi, Maldives, Mauritania, Mozambique, Mexico, Nepal, Netherlands, Nicaragua, Nigeria, Panama, Papua New Guinea, Paraguay, Pakistan, Peru, Philippines, Portugal, Puerto Rico, Rwanda, Senegal, Singapore, Sri Lanka, Sudan, Switzerland, Tanzania, Thailand, Togo, Tunisia, East Timor, Tunisia, Turkey, Uganda, United Arab Emirate, United Kingdom, United States, Vietnam, Yemen, Zambia, Zimbabwe

“A Green, Not Only For Profit Company”
Examples of Hermetic Storage from Around the World

“A Green, Not Only For Profit Company”
Manju Khanal is a member of a small farmer cooperative.

She stores corn in SGBs (SuperGrainbags™) in Mulpani Village, Nepal.
Training in Nepal

“A Green, Not Only For Profit Company”
COOPS & SMALL FARMERS

South Sudan, 2011

Training class

Training on 50-tonne Cocoon

“A Green, Not Only For Profit Company”
COOPS & SMALL FARMERS

Long Term Green Coffee Storage

Monte de Oro Cooperative, Costa Rica 2001

“A Green, Not Only For Profit Company”
COOPS & SMALL FARMERS
Guatemala – Coffee in SuperGrainbag™

Coffee Beans in SGB with Protective Jute bag

“A Green, Not Only For Profit Company”
COOPS & SMALL FARMERS

Afghan farmers with their SuperGrainbags™

USAID Program – Helman Province

“A Green, Not Only For Profit Company”
TRADERS

Trader with Corn in SuperGrainbags™, Ghana

SuperGrainbags™ Sold at Retail in Ghana

“A Green, Not Only For Profit Company”
Warehouses & Large Outdoor Stores

Large Scale Hermetic Storage

INDOOR

Loading Corn in a Cocoon-Rwanda

OUTDOOR

Seed storage in Rwanda

“A Green, Not Only For Profit Company”
Processors & Exporters
150-Tonne Cocoons

Cocobod, Ghana
Cocoa Storage
Prevents Growth of FFAs & Aflatoxins

Cargill, Philippines
Corn for Feed

“A Green, Not Only For Profit Company”
PROCESSORS & EXPORTERS
TranSafeliner™ in Guatemala
(For intercontinental shipments)

“A Green, Not Only For Profit Company”
Ghana cocoa board (cocobod)

Ghana COCOBOD storing cocoa in 20-tonne Cocoon™, Tema, Ghana
“Hermetic Storage of Rice is becoming increasingly popular across Asia, and for good reason – as well as being transportable, it is better than air-conditioned storage and almost as good as a cold room, at a fraction of the cost.”

~Rice Today - January-March 2009, Martin Gummert, IRRI
AMERICAS - Through International Agency
Guatemala Small Farmer

Storage of Maize -- 1 Tonne GrainSafes™

“A Green, Not Only For Profit Company”
Private / Public Partnership
GrainKeep™ Center
Mindanao, Philippine Project 2013

Key Components:
- Cocoons for Crops
- Collapsible Dryer Case™
- Small Office / Test Lab
- Test Equipment
- Shed-Shelling
- Bagging / Cleaning

“A Green, Not Only For Profit Company”
Collapsible Dryer Cases™
Solar drying

Collapsible dryer cases help farmers to quickly dry the grain using the sun shine and without food spoilage. This reduces incidences of aflatoxin development in food.

Seeds in Santa Marta, Colombia

“A Green, Not Only For Profit Company”
Summary

Forms of Modern Post Harvest Storage Solutions
Airtight Storage 60kg – 1000 tonnes

“A Green, Not Only For Profit Company”
THANK YOU!

Do you have questions about hermetic storage?

“A Green, Not Only For Profit Company”
Thank you for joining us!

Share Feedback

Please take our 3 minute survey:


You can also visit the event page to post comments & questions.

Stay In Touch

Contact Us:
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Upcoming Events

Ag Sector Council | April 24 | IFDC

Agrilinks and the Agriculture Sector Council Seminar Series are products of the USAID Bureau for Food Security under the Knowledge-Driven Microenterprise Development (KDMD) project.