

This paper is part of a knowledge sharing series to inform better programming and communicate results.

## WFP Uganda and Burkina Faso's Trial to Reduce Post-Harvest Losses for Smallholder Farmers



Every year across Sub-Saharan Africa, unacceptable levels of food loss continue to occur. In 2011, the UN Food and Agriculture Organization (FAO) reported annual food losses in the region exceeding 30 percent

of total crop production, valued at more than US\$4 billion. Although losses are found at every stage in the supply chain, the bulk occur pre-farm gate due to poor harvesting, drying, processing and storage of crops. These losses directly contribute to the food insecurity of millions of smallholder farming families.

As food represents up to 80 percent of household spending, and crop production is the principal source of family income, there is considerable potential to improve food security and livelihoods.

WFP conducted an Action Research Trial in Uganda and Burkina Faso involving governments, NGOs and private sector partners to address post-harvest food losses at farm-level. The trial built upon existing programmes, Purchase for Progress (P4P) networks and work already done by FAO and IFAD to improve post-harvest practices. It focused on 400 farmers and applied proven practices from developed countries, recent learning from successful trials in other developing regions, and theoretical recommendations from research.

WFP's trial was highly successful, illustrating that post-harvest crop losses in developing countries can be dramatically reduced when appropriate capacity development and improved farming equipment are introduced. WFP has recently mounted a special operation to reach more farmers with the improved technologies and practices.



### Where did the trials take place?

Two farming districts were selected from both Uganda and Burkina Faso. Target study sites were located within small villages in Gulu and Soroti districts in Uganda and the districts of Bobo-Dioulasso and Ouahigouya in Burkina Faso.

### Who was targeted?

The trial directly involved 400 low-income smallholder farmers, of whom nearly 40 percent were female. Two hundred families benefitted directly in both countries where the trial was conducted.

### What was the impact?

For all participating farmers, without exception, the new procedures and technologies enabled food losses to be reduced by more than 98 percent regardless of the crop and regardless of the duration of storage. The near-eradication of post-harvest food losses at the farm level was a very significant outcome in itself, and was further amplified by the additional benefits of augmenting household finances (as crops could be stored and sold during more favorable market conditions), improving family well-being (through increased nutrition and reduced exposure to food contaminations) and increasing the surplus of quality food available for community consumption.

The technologies used also reportedly reduced women's workloads as the time-consuming process of daily cleaning and shelling of cereals was eliminated.

### What was the timeframe?

The research trial was carried out between August 2013 and April 2014. Preparatory stages leading up to the harvest in December were followed by a three-month period of field support and close monitoring of the trial results.

# How WFP Uganda and WFP Burkina Faso did it.

## KEY STEPS

1

### **Identified successful post-harvest management (PHM) practices used in other regions.**

Instead of piloting completely new PHM practices and technologies, WFP put into effect proven farming practices from developed countries and well-researched ideas from expert organizations. The use of proven methods increased the chances of the trial's success.

2

**Partnered with governments, NGOs, United Nations and the private sector.** Partnerships provided WFP with knowledge and expertise, existing networks and access to local communities. The collaboration and buy-in of governments at the central and district levels aimed to ensure the sustainability of the trial's results.

3

**Developed farmer capacity.** One-day training workshops increased farmer awareness of key biological and environmental factors leading to grain rotting and fungal infestation, qualitative and quantitative losses from insect and weather spoilage, and food safety hazards. Capacity development focused on preventing these issues during five procedural stages: harvesting, drying, threshing, solarisation and on-farm storage.

4

**Distributed new farming equipment and provided field support.** Detailed demonstrations regarding the correct handling procedures for the new storage units were provided and all participating farmers received one or more of the new storage units, as well as equipment to assist with drying and solarisation of crops, to use on their farms for the upcoming harvest.

5

**Monitored the process closely.** More than 30 percent of trained farmers were involved in the monitoring phase, representing small- and medium-size farming families, all the storage technologies and major crop varieties, and sub-counties from all selected districts. Loss measurements were recorded at 30, 60, and 90 days. Samples from storage units were analysed and the weight of undamaged crops was recorded at the end of the process.

6

**Reported and disseminated results.** A comprehensive report, [Reducing Food Losses in Sub-Saharan Africa](http://documents.wfp.org/stellent/groups/public/documents/special_initiatives/WFP265205.pdf), was prepared to demonstrate the successes and learning from the project. The report was circulated globally through numerous channels, including UN agencies, learning institutes, donor contacts, and food security conferences. It can be found online at: [http://documents.wfp.org/stellent/groups/public/documents/special\\_initiatives/WFP265205.pdf](http://documents.wfp.org/stellent/groups/public/documents/special_initiatives/WFP265205.pdf)

## New Technology Farming Equipment used in the Action Research Trials



**Super Grain Bags**  
(<100 kg)  
**Excellent Performance**

Multi-layer polyethylene storage. Water resistant and airtight, but no rodent protection. Placed inside ordinary storage bags. Environmental issue of plastic disposal.

Price: USD 2.50–USD 3  
Life: 2-3 harvests



**Zero Fly Bags** (<100 kg)  
**Very Good Performance**

Insecticide-infused polypropylene bags. Limit infestation of grain within the bag (short period where insects can survive before contact with inner lining of bag). Not hermetic, no rodent protection. Environmental issue of plastic disposal.

Price (estimate): ≤ USD 3.50  
Life: 2-3 harvests



**Plastic Silos** (100-150 kg)  
**Very Good Performance**

Plastic PVC storage units. Simple conversion of locally produced liquid storage containers. Highly durable and, with minor adjustments, hermetic. Rodent and pest proof. Deoxygenation at filling can be difficult. Environmental issue of plastic disposal.

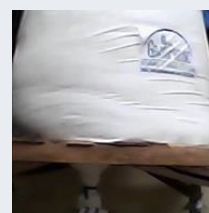
Price: USD 20–USD 36  
Life: 5–7 years



**Metal Silos**(540-1200+ kg)  
**Excellent Performance**

Robust units constructed from galvanized iron. Water resistant, hermetic, rodent and pest proof. Provide protection against thieves. Require structural adjustment to home prior to storage. Long-term solution.

Price: USD 200–USD 320  
Life: 20–25 years



**GrainSafes** (1000+ kg)  
**Very Good Performance**

Made of food-grade, UV-resistant flexible PVC. Designed for both indoor and outdoor installations. Provides compact storage for large volumes. Water proof and hermetic, but no rodent protection.

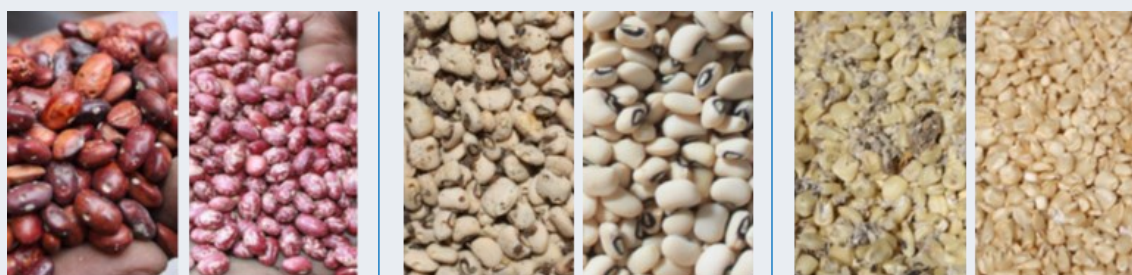
Price: USD 180–USD 200  
Life: TBA



**Improved Traditional Granaries** (1000+ kg)  
**Poor Performance**

Improvement to traditional storage. Made of local material. Inexpensive and durable. Rodent protection added, but unable to resolve post-harvest problems of pest infestation, moisture control and resistance to the elements. Not hermetic.

Price: USD TBA



Side-by-side comparison of crops after 90+ days of storage using traditional and new storage units.

Left: Red beans  
Middle: Black-eyed peas  
Right: Maize

### How were communities involved?

Participating farmers were selected among registered members of WFP's Purchase for Progress (P4P) Farmer Organizations, and all training, mobilization and support under the trial was restricted to this particular group. However, a subsequent special operation in Uganda has reached an additional 16,300 beneficiaries.

### Who were the main partners?

Within WFP, the trial benefitted greatly from the active support, existing networks and strong relationships of the P4P project in both countries. Furthermore, the trial was designed to complement a three-year interagency project with FAO and IFAD to mainstream food loss reduction initiatives. Sponsored by the Swiss Agency for Development and Cooperation, the joint project provides a global information platform for streamlining best practices in post-harvest management, to which the lessons learned from the WFP field trials will directly contribute.

The field monitoring and trial evaluations were carried out by three independent farmer organizations.

### What were the success factors?

**Taking advantage of existing research.** The well-documented research conducted in Central America by the Swiss Agency for Development and Cooperation informed WFP's trial design and implementation. The *PostCosecha* programme was developed in Honduras in the 1980s and scaled up throughout Central America.

It was a successful initiative which greatly advanced post-harvest management practices of local smallholder farmers and led to very high adoption rates of new storage technologies and significant reductions in annual food losses over a period of more than 20 years.

**Utilising existing P4P networks.** Taking advantage of the established knowledge and resource infrastructure enabled the trial to move quickly and build upon the good work already done in the chosen districts by WFP P4P, FAO and IFAD to improve post-harvest systems at the community level. P4P also played a critical role beyond the research trial by providing the participating smallholder farmers with increased opportunities to connect with agricultural markets and receive fair market prices for their surplus product.

**Providing all training material to farmers in the local district languages.** Although administratively challenging, translated materials removed any potential language barriers and expanded the learning as farmers could share the materials with family members and villagers not attending.

**Following a zero fumigation policy.** Phosphine fumigation against pests was not allowed during the trial, as correctly sealed hermetic storage units were expected to quickly kill any pests or insects present at the time of storage through oxygen deprivation. As the use of fumigants is officially forbidden in some African countries, the proven success of the storage technologies without fumigants is significant for the wider dissemination of these technologies on the continent.



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## What were the challenges?

**Selecting and engaging the right partners.** The trial required partnerships at strategic and operational levels. Since the project spanned multiple regions, the identification of implementing partners was more challenging. It also meant that the engagement of government actors at different levels and in many locations had to be secured and maintained.

**Selecting and training the participating farmers.** Ensuring sufficient participation of women in all trainings was a key requirement of the trial. Once participants had been selected, the project had to provide context appropriate training. Specific programmes had to be developed in local languages to match regional crops and farming practices. Several trainings-of-trainers had to be organised to equip the people involved in outreach with both technical knowledge and presentation skills. The project also had to grapple with logistical challenges in organising venues and transporting presentation and demonstration equipment, training materials, power generators and facilitators and even caterers to many remote locations every week. After the initial trainings, field support teams had to be organised to provide refresher training and to ensure that the new storage equipment was being used correctly by farmers.

**Organising the production and distribution of PHM equipment.** As the equipment used in the trial was new to the project context, local artisans had to be identified and then trained to produce the equipment meeting high standards for quality and timeliness. Raw material prices and shipping costs had to be negotiated with suppliers. Once produced, the equipment had to be distributed to hundreds of individual farms, which required the identification of reliable transport providers with fleet capacity to reach remote farming areas on schedule, despite poor road infrastructure.

**Monitoring and replicating results.** The broad geographical area covered by the trial made the collection of detailed monitoring data more challenging – but the continuous reporting of results was important in order to keep strategic partners updated and engaged in the project. In order to facilitate the replication of the results in other contexts, a clear link had to be made between the project's performance indicators and specific learning outcomes.

The trial successfully overcame all of these challenges, and similar projects would benefit from anticipating them in their planning.

## What were the lessons learned?

All of the new technology storage units proved to be highly effective. The hermetic units performed marginally better than the treated, non-hermetic storage units; however, compared to the biological impact recorded within the traditional non-treated, non-airtight environment, all five of the new options were successful. The sixth option, the modified traditional granary, failed to provide measurable improvements against the non-modified units.

## How much did it cost?

The approximate cost of the trial was USD 75,000 in Burkina Faso and USD 80,000 in Uganda.

## How can it be sustained and scaled up?

The approach adopted is highly scalable as indicated by the strong performance in the trial as well as the previous track record of the technologies tested. None of the equipment or procedures in the trial were new, which means that the expertise required for their broader implementation exists in the global farming technology community. The degree to which the successful technologies and practices can be disseminated depends largely on the supporting policies of host governments and the willingness of collaborating agencies and the global community to assist with implementing the solutions.

## What skills are required for success?

The introduction of activities similar to this trial requires some technical knowledge and skills. Familiarity with local post-harvest handling practices, an understanding of food safety issues and the causes of post-harvest losses, and practical knowledge of proven post-harvest management methods are crucial to enable context-appropriate training of farmers and the selection of the most suitable technologies. Skills in communication, building networks and negotiating agreements are also helpful to ensure community buy-in, garner resources and support, and maintain momentum.

## What has happened since?

WFP greatly increased the scale in Uganda in early 2015 — 16,600 farmers received training, and then each farmer purchased an improved storage unit. An evaluation conducted in coordination with MIT found consistent results, with an elimination of over 98 percent of post-harvest losses. WFP is now training 40,000 farmers in Uganda, and preparing to scale up to even larger numbers as the post-harvest loss project is integrated into the country programme. With the help of WFP's new Global Post-Harvest Knowledge & Operations Centre, this project is now being extended to Rwanda and Sudan.

## Last Word

Increasing the number of effective household storage units in each farming district is an important aspect of regional food security and rural livelihoods since it ensures continuous stable supply of food, provides better farm incomes and significantly increases quantity of safely stored grain. The proven, affordable and scalable post-harvest handling technologies and practices implemented in this action research trial can make a strong contribution towards the Zero Hunger Challenge — to achieve 100 percent access to adequate food all year round, sustainable food systems, growth in smallholder productivity and income, and zero loss of food.

