Effective Seed Storage in Rural Timor-Leste (ESS)

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Executive Summary

Program Overview

The majority of farmers in the target districts of Ainaro and Manufahi in Timor-Leste rely on subsistence agriculture for their livelihoods and are effectively caught in a poverty trap, with poor seed quality and poor storage fundamental to this problem. The continuous use of farm saved seed leads to reduced yields, and the lack of appropriate on-farm storage results in a high percentage of post-harvest seed loss. These problems, combined with a lack of market access, result in falling incomes for farmers over time. At present, effective storage for seed is not available for the majority of farmers in rural Timor-Leste. Based on the results of an in-depth preliminary assessment, Mercy Corps is implementing a seed storage program to introduce appropriate and effective post-harvest storage systems, primarily focusing on maize, the main staple crop in Timor-Leste. Through the Effective Seed Storage (ESS) program Mercy Corps is moving away from the distribution/handout model, and implementing a market-led approach to storage that has not been applied in Timor-Leste to-date.

The ESS program involves local manufacturers in efforts to increase access to improved storage systems, and combines this with capacity building for farmers and extension workers to sustainably link farmers with viable input and output markets. The program complements an existing 3.5 year, $1.7 million European Commission (EC) funded Sustainable Crop Production, Utilisation, and Resource management through Capacity Enhancement in two districts of Timor-Leste (SECURE) program, implemented by Mercy Corps and partners in the two target districts. ESS will fill a critical gap in the ongoing program while benefiting from cost efficiencies and established relationships with farmers and the Ministry of Agriculture.

Performance Summary

Sector: Agriculture and Food Security	**Objective:** Sustainable post-harvest protection of seeds and grain stocks improve crop production and livelihoods in rural Timor-Leste				
Beneficiaries Targeted	27,503 IDPs: 0		Budget	$247,501	
Beneficiaries Reached	0 IDPs: 0	0% 0%	Amount Spent	$	
Geographic Area (s)	Ainaro and Maufahi District - Timor Leste				
Sub- Sector: Seed Systems and Agricultural Inputs					
OFDA Indicator	Baseline	Target	Progress (Date)		Last Day of Report Period
1. (Projected) increase in number of months of food self-sufficiency due to distributed seed systems/ agricultural inputs for beneficiary families.	Number of months of food sufficiency is 8.1 months	At least 3 months	0		December 30, 2011
2. Number people benefiting from	0	1,560	0		December

seeds systems/agricultural inputs activities					30, 2011
Mercy Corps Indicators					
2.1 # of improved storage designs	0	3	3		February 29, 2012
2.2 # of local storage manufacturers trained	0	4	2		July 31, 2012
2.3 # of trainings	0	52	34		July 31, 2012
2.4 # of early adopters	0	1,560	0		December 30, 2011
2.5 # of additional farmers with access to storage solutions	0	3,120	0		December 30, 2011
2.6 % decrease in seed storage losses amongst pilot farmers	0%	50% reduction in seed loss	0		December 30, 2011
2.7 # additional months maize is available in the household as a result of improved storage	0	3	0		December 30, 2011
2.8 # of farmers purchasing storage for seed	0	3,120	0		December 30, 2011
2.9 % increase in grain / seed sold by farmers as a result of new storage solutions	0	30%	0		December 30, 2011
3. # of extension workers trained in both districts	0	26	37		March 21-22, 2012

Sector Summary/Major Accomplishments

149 farmers in four communities were consulted to identify the preferred storage unit design developed by the project

Following the assessment completed in February,[1] project staff led a rapid consultation process with farmers to select the storage unit to be developed by the project. The assessment identified and recommended the use of polymer drum, plastic water bottle or bag inside metal or wooden container, and plastic tote. In addition, custom manufactured silo, as well as used glass bottle/jar and metal biscuit container were identified as options. As some improved models identified and recommended in the assessment are currently not available in district, sub-district

[1] Reported on in previous Quarterly Report (January – March 2012).

or community markets,[2] the project team decided to begin by developing one or two solutions before initiating market development. From April to May 2012, the project conducted consultation meetings with 4 communities (Orana, Holarua, Foho-Ailico and Suro-Craic) on the selection of the best storage unit for production through the project. From a total number of 149 farmers participating, 87% selected a metal silo with airtight lid, 9% selected a metal silo with large opening, and the remaining 4% selected other designs.

It is understood that a custom designed silo model is preferred by farmers because it has locally desired attributes (oxygen free – hermetic/airtight environment, rat and fire resistant and durable in humid tropical climate condition, among others) and embraces the 'drum culture' of Timorese farmers. The plastic drum initially predicted to be one of the main desired choices was ultimately not selected because of perceptions that it would be neither rat- nor fire-resistant, and the thought that farmers may use it for storing water instead of seed. With the preferred silo model identified, the ESS team then focused on developing the market around it. Detailed documentation of this process can be found in Annex 1.

2 local manufacturers were selected and trained to produce improved seed storage units for supported farmers After the preference for the custom metal silo with airtight lid was made clear, the ESS team identified inactive manufacturers, originally trained and supported by the Food and Agriculture Organization of the United Nations (FAO) to produce silos between 2008 and 2010. They were invited to partake in a sealed tender quotation process to develop the market for seed storage silos in the target districts. It was made clear to the tender participants that the project will use a voucher system, and that there will be further negotiation on this following the open tender session. Four manufacturers submitted tender documents, from which the project selected two local manufacturers.

From a market development perspective it may be better if there are more market players offering similar or complementing products in the market, in a sense that it would enable a competitive environment for the providers[3]. However, like with all inputs in the Timor-Leste market, effective seed storage units are nearly non-existent in the market (or if they exist, they are weak. See Annex 1 for more detail)[4]. On the other hand, many rural farmers are used to operating in a subsistence system which relies on traditional production techniques and they have little experience with purchasing inputs. Because of this, stimulating both supply and demand is an essential part of the ESS project. The decision to select just two manufacturers at this stage of the project (one per target area) was made for the following reasons: (i) there are just two FAO-trained silo makers in the target districts and introducing the manufacture to others would require significant training; (ii) in order to negotiate the lowest price with the bidders and select the cheapest option (the unsuccessful bidders would have required significant costs to transport silos from their production sites in Dili and Baucau to the target districts[5], if selected; (iii) by limiting the number of supported manufacturers, the project can focus most energy on developing and

[2] Some solutions are imported products and are available only in Dili (the country's capital city) and some others can be produced locally but required the development of the market system for broader outreach and its business sustainability.
[3] Competitive environment is believed to be an effective way to reduce cost and enhance innovation.
[4] This is also the reason why do we focus only on the silo.
[5] Transporting produced silos is much more expensive than transporting materials as silo is a bulk product.

testing the supply-side supports to further future supply, and to deepen understanding of the demand side factors, including farmer ability to pay, etc. Last but not least, the project has calculated that the two selected manufacturers will have capacity to support the targeted early adopter farmers.

Arnaldo da Silva from Same in Manufahi was selected to produce silos for farmers in Manufahi and Mario de Jesus from Cassa in Ainaro was selected to produce silos for farmers in Ainaro. The ESS team trained the selected manufacturers on the new model, ensuring units will be airtight and possess other desired attributes. Dependent on its size, the price of the silo is expected to be between $25 - $35.

Additionally, during this reporting period, the project facilitated several B2B (business to business) meetings between manufacturers and suppliers of materials in Dili--linking them and ensuring a sustainable supply of materials. The B2B meetings have proved an effective way to establish a working business relationship between rural manufacturers and input suppliers in Dili that makes required materials that are traditionally difficult to obtain more available and easily accessible for manufacturers.

Voucher system is developed to support farmer access to selected storage unit

A voucher system will be used to subsidize farmers' adoption of the new silos. This method was selected as it is believed to be an effective way to initiate direct 'transactional interaction' between farmers (as consumers) and producers (as suppliers). The project will distribute a voucher valued at $20 to target farmers that can be redeemed to get the storage unit. The farmer then will be responsible to cover the difference between the actual price and the value of the voucher, as the price of the unit is more than the value of the distributed voucher. Rather than directly distributing the units or providing full-value vouchers, it is expected this method, which gives exposure to the unit's actual cost, will enhance farmers' 'sense of ownership' of the product. It is expected that requiring this individual investment will cause farmers to value the silo more highly, and further increase their awareness of the importance of high quality seeds.

However, the voucher will only target selected early adopter farmers; other farmers who want the silos will have to pay the full price. The project team formed selection teams within each suco consisting of suco or aldea chiefs, government extension workers, and project and partner staff. The selection criteria for targeting early adopters include (i) high level of vulnerability and/or food insecurity; (ii) willingness to participate in post-harvest training and other project activities; (iii) willingness to share learnings and data with the project and other farmers; (iv) not currently served by other organizations or government on similar activities; and other criteria as deemed appropriate by each selection committee. During this reporting period, 387 early adopters in Daisua, Holarua, Cassa and Leolima sucos have been selected to receive vouchers.

774 farmers in 44 aldeas were trained on good practices in post-harvest handling

Suco	Female	Male
Maununo	16	29
Cassa	41	59
Soro-craic	19	51
Leolima	36	105
Foho-Ailico	45	60
Daisua	23	58
Holarua	49	100
Rotuto	5	7
Grotu	16	55
Total	**250**	**524**

In partnership with government extension workers and local NGO partners, the project staff facilitated post-harvest training for the farmers.

The two-day training activities were designed to combine theoretical and practical/experiential techniques adopting adult learning principles as well as good local practices (such as a mouth-bite method to determine the level of grain/seed moisture and whether it is ready for storage). The training covers not only post-harvest techniques for maize and rice but also for various beans. It also includes information on seed production and selection, harvest time and technique, drying method, storage technique, etc.

The training was also used to promote a variety of effective seed storage solutions and to disseminate project plans to support farmers' access to the selected storage unit. During this reporting period, a total number of 774 farmers (32% female) have enthusiastically participated in trainings across 44 aldeas (of 55 targeted) in 9 sucos (of 11 targeted).

Cross-Cutting Themes

N/A

Monitoring and Evaluation

There was no substantial M&E activity during this reporting period, except regular monitoring visits by the program manager and project coordinator to oversee field training activities and monitor the readiness of storage manufacturers to produce the units (accomplished through quality checks).

Coordination and Meeting

Regular coordination meetings with the INGO Food Security Working Group were held during this reporting period, including a sharing workshop with the Ministry of Agriculture and Fisheries (MAF) and the working group on May 23, 2012 in Dili. During this workshop, the program manager presented good practices in seed storage that have emerged from the project to date. In addition, the project team has continued supporting the UN Food Security Cluster in finalizing the contingency plan for Timor-Leste through active involvement in both off-line and on-line discussions.

Success Story

From the field: A silo manufacturer is ready for his new business model

Arnaldo Da Silva, a father of three children, currently resides in Betano, Same, Manufahi district, and is a farmer turned FAO-supported silo manufacturer in the district. When asked when he started to make silos, he confirmed, "*I was trained by FAO in 2009 and produced silos for grain storage from then up to 2011 when the project finished*."

Similar to other silo manufacturers in the country, Arnaldo's production has been totally dependent on orders from donors or INGOs providing materials for him to produce silos for distribution to farmers. He added, "*Sometimes I have to say 'sorry' to farmers who come here and want to buy a silo, but I could not sell it as the [produced] silo was designated for farmers supported by the INGO that provided the materials.*"

But this is about to change; through the ESS project, Mercy Corps links Arnaldo's business with input suppliers in Dili, creating an independent and sustainable production model. Arnaldo further said, "*I was supposed to do this from start, so that I have my own business and no need to say sorry to farmer [who was rejected]. But I am ready to change now.*"

Note: the picture on the cover page of this report shows seed storage units produced by Arnaldo and ready to be sold.

Annex:

Design and selection process of seed storage unit

Effective Seed Storage (ESS) Program

Design and selection process of seed storage unit

The February 2012 study on effective seed storage solutions for Timor-Leste that was conducted by Dr. Bruce Litchfield from the University of Illinois recommended the use of polymer drums; plastic water bottles or bags inside of metal or wooden containers; and plastic totes. In addition, custom manufactured silos; used glass bottle/jar and metal biscuit containers were identified as potential solutions.

The desired attributes of an effective seed storage solution include: oxygen free – hermetic (airtight) environment, rat and fire resistant, and durable in a humid tropical climate condition. In addition the study identified the importance of the 'drum culture' of farmers in Timor-Leste, where used oil drums are commonly used and embraced. However, used oil drums have limited availability and limited size options. It is thought that their use has to some extent discouraged farmers from separating their seed from food grain. In the local language, Tetum, the word for seed is *fini* and there is no specific term for grain; in most cases farmers treat both as one commodity. The study also confirmed that the fundamental barrier to effective storage solutions in Timor-Leste is lack of availability and accessibility.

The challenge for the ESS project is therefore to find a storage unit that (i) conveys desired attributes, (ii) encourages farmer to distinguish that the stored *fini* is a high quality and high value to be used as seed rather than food, (iii) embraces drum culture, and (iv) ensures that the project will be able to develop the market system for identified solution(s), to ensure its availability and accessibility for broader target farmers.

> "Design thinking incorporates constituent or consumer insights in depth and rapid prototyping, all aimed at getting beyond the assumptions that block effective solutions. Design thinking—inherently optimistic, constructive, and experiential—addresses the needs of the people who will consume a product or service and the infrastructure that enables it."
>
> Tim Brown & Jocelyn Wyatt, *Design Thinking for Social Innovation*, Stanford Social Innovation Review Winter 2010

Each of the recommended seed storage options has pros and cons; the ESS project team decided to run a further in-depth exploration to assess the market viability of the proposed solutions. Polymer drums and plastic totes are imported products and currently only available in Dili, the capital city. Custom manufactured silos can be produced locally (at district level) but the existing business model of the manufacturers was very donor-dependent (the manufacturers only produced silos based on orders from a donor agency, which imported the materials and provided them directly to the manufacturer). The existing silo manufacturing model was therefore unsustainable; furthermore, the available silo designs were not airtight. Wooden containers are unavailable in the local markets, but local carpenters could be able to produce it.

In short, the local market (at community level) for the polymer drums, plastic totes, silos and wooden

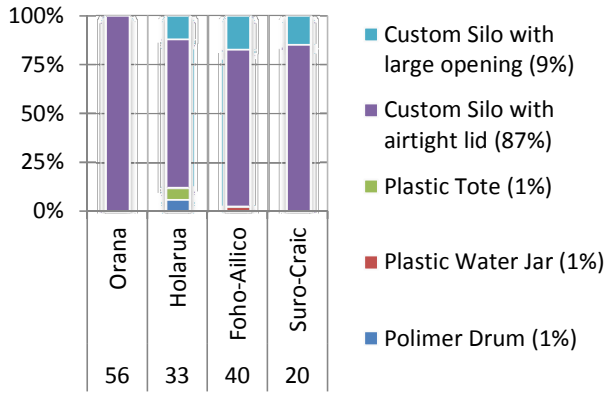


container products is non-existent, and thus requires effort from the project to introduce, develop supply chain, and promote demand.

Following the study, ESS decided to develop prototypes of improved quality silos (to be airtight and smaller, as needed for seed storage) and wooden containers to test. The project found that high quality wooden containers would be prohibitively expensive, and thus decided to drop it from the options for further exploration.

In light of the poor economic and physical infrastructure conditions in the target areas, developing supply chains for multiple products would be very challenging, and for that reason the project needed to strategically select and focus efforts on the most in-demand storage solution.

To ascertain which would be best, in April 2012 ESS conducted a series of consultation meetings with four communities (in Orana, Holarua, Foho-Ailico and Suro-Craic) to select the storage unit that will be the main focus of the project. From a total number of 149 participant farmers, 87% participant selected metal silo with airtight lid, 9% selected metal silo with large opening, while the rest selected other storage units.



Custom manufactured silos were prioritized by farmers because it conveys the desired attributes and it embraces the 'drum culture'. ESS anticipated that the polymer drum would be one of the most desired options, but it was not selected because it is a non-metal solution that is perceived to not be rat resistant, it is not fire resistant, and farmers use it instead as a water container.

Although the cost of the metal silo is relatively high when compared with the other options, the project team believed that there must be an alternative metal sheet to be used to reduce the cost. For that reason ESS conducted rapid consultations with suppliers of metal sheets and identified cheaper materials that

have similar or, if not, only slightly lower quality than the initial metal sheet used, but is still able to retain the desired attributes of effective seed storage. The second prototyping process included the use of cheaper metal sheets and different PVC caps and increased the involvement of the manufacturer, to start to develop linkages between manufacturers and the material suppliers. The project aimed for solid metal storage units that cost $40 to $50 but have come up with a much lower cost at $25 to $35, depending on the size.

The way forward. The ESS project team is continuing the effort to 'change' the manufacturers' business model from donor-dependent to a more sustainable model by linking them with material suppliers and business development providers (such as the government funded Institute for Business Support – IADE for business management training). In addition to that, limited support will be given to the early adopter farmers to access the units. A smart subsidy using a voucher system will be used as a strategy to facilitate the direct 'transaction interaction' between silo manufacturers (supply) and farmers (demand).