

AFGHANISTAN: POTATOES

Improved storage transforms potato crop



Figure 1: Traditional potato storage pit.

The potato is the only cash crop available to most households in the Central Highlands of Afghanistan. Production is restricted by an inability to effectively store both seed and ware (eating) potatoes, with the result that poor-quality seed is used at planting and most of the crop must be sold at harvest when prices are low.

Traditional practices

Farmers traditionally store potatoes not intended for immediate household consumption in pits dug in or near the field at harvest. Potatoes are placed in the pit and the tubers covered with a thick layer of soil to prevent freezing (Figure 1). Due to snow cover, pits cannot be opened for inspection or partial removal of the tubers during the winter, so there is a risk of extensive damage due to water penetration, frost and disease.

Assessments confirmed the general perception that winter storage losses of potatoes ranged from 40 percent to as much as 100 percent, together with a serious loss in quality for the remaining potatoes. The losses were due to the living potato tuber respiring in store, and giving off heat and moisture, enabling the development of bacterial and fungal decay.

Behavioral approach

In its agricultural livelihoods programming in Middle Eastern and Central Asian countries, CRS has been introducing a flexible behavioral approach based on social behavior change and industry-wide best practices developed in the health sector. Simple, responsive, low-cost, low-risk practices capable of giving a measurable (30+ percent) increase in productivity are identified and promoted through short, timely trainings.¹ For potato storage, two behaviors were identified: (a) provide ventilation throughout the pit to allow excess heat and moisture to escape; and (b) before storage, carefully sort the potatoes to remove all damaged and diseased tubers to reduce the likelihood of introducing disease into the pit.

Highlights

- Storage losses fell to less than 5 percent from more than 40 percent
- Crop yields in the subsequent year rose by between 15 and 88 percent
- Farmers adapted the practice for the storage of ware potatoes
- The value of potatoes doubled in the 6 months of storage
- There was a high replication rate within target villages
- Doer/non-doeer analysis enabled accurate outcome assessment

1. See Agricultural Behavior Change Introduction: *Introducing social behavior change to agricultural development*

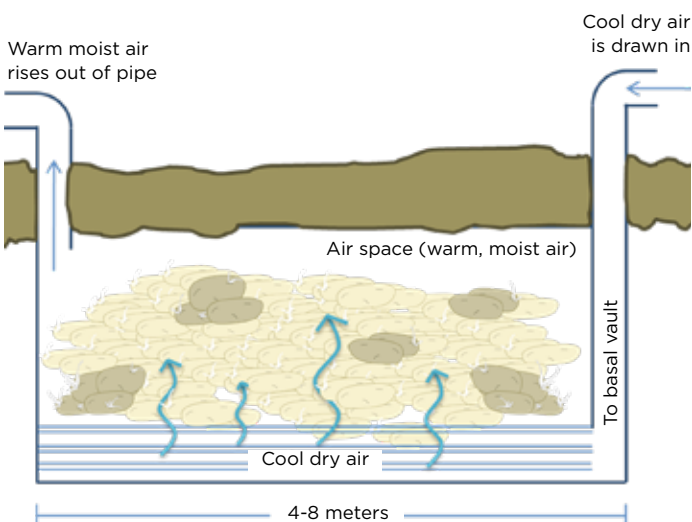
Recommended changes

Farmers identified their primary production concern as the limited seed availability due to the inability to store potatoes over winter. In 2011, CRS, with financial support from USAID-OFDA,² designed a low-cost solution to improve ventilation to remove excess heat and moisture from potato storage pits (Figure 2). Ventilation is provided by creating a small cavity above the potato stack in the pit. Warm air and associated moisture rise and become trapped in the cavity. By creating a vent using 150 mm piping, this air can be released, allowing cool air to be drawn in from outside through a second pipe that brings air down to a vent at the base of the pit (Figure 3).

Figure 2: Improved storage pit showing vents.



Figure 3: Modified store design



2. Quality Potato Seed through Improved Production and Storage Practices. United States Agency for International Development Office of U.S. Foreign Disaster Assistance. AID-OFDA-G-11-00179

About 6 weeks before harvest, CRS discussed the proposed modifications to traditional storage pits with farmers in 13 communities in two different agro-climatic zones of Ghor Province. Up to 40 farmers in each community, who were prepared to store 40 kg of their own seed communally for the full winter period, constructed an improved pit incorporating their own suggestions. Construction cost \$10 to \$20, and similar stores have now been in operation for 8 years.

To ensure only healthy potatoes were stored, CRS ran a short training on improved selection practices just before harvest. It was open to all interested community members. A male and a female member of each household was encouraged to attend since both are involved in potato harvesting, to allow for equitable household discussions and planning. The training was less than an hour long, for minimum disruption to daily household routines. Community members were free to ask questions on any related topic.

Each household selected 40 kg of disease- and damage-free, seed-size tubers. These were placed in open net bags, and weighed and labelled before being placed in the store. In early spring, the bags were removed, and each household sorted and weighed their potatoes and calculated their losses. The tubers were then planted by the farmers in plots alongside tubers that had been stored in their traditional pits. All cultural practices were the same for both plots during the cropping season. Farmers were encouraged to regularly observe the plots and, at harvest, a sample from the plots was assessed for yield and quality.

Outcomes

Losses in store during the first 2 years of activities were reduced to less than 5 percent (Table 1). Differences between years were due to a very harsh 2011–2012 winter—when farmers’ losses were often reported as 100 percent—and slight improvements to store design in the second year.

Table 1: Mean losses in weight from improved pits

Storage period	Villages	Households	Mean loss (weight)
Oct 2011 – Apr 2012	12	478	4.5%
Oct 2012 – Apr 2013	13	456	2.0%

Demonstration stores have now been constructed in over 130 villages across seven districts of Afghanistan’s Central Highlands. No systematic assessment of replication has yet been made, but recent (2019) farmer feedback sessions suggest that about 80 percent of households in most target villages now have access to an improved pit. Farmers with small quantities to store share a store, usually averaging between three and five households per store.

Although the original demonstrations were for seed storage, farmers immediately saw the potential to store their ware potatoes in a similar fashion. All farmers now use the stores for both seed and ware potatoes, placing their selected seed in open net bags within the potato stack.

Figure 4: Ware potatoes after 7 months in storage



The following season, crops from seed stored in the improved pits yielded consistently higher than seed from the same harvest stored traditionally (Table 2). The magnitude of the increase was much greater in Chaghcharan District (2,000 meters above sea level), which is less conducive to potato cropping, than in Lal wa Sarjangan District (>3,000 m asl), suggesting the improved-pit seed has greater resilience to adverse conditions. The farm price of these potatoes after 6 months in storage (\$0.40) was twice that at harvest (\$0.20). The increased flexibility in utilization and value after storage of the potatoes was greatly appreciated by farmers.

Table 2: Harvest yields (kg/10m²), Oct 2012

District	Store type	No. of samples	Weight of healthy tubers (kg)*
Chaghcharan	Improved	7	37.0
Chaghcharan	Traditional	19 [†]	19.7
% increase			88%
Lal wa Sarjangan	Improved	23	42.3
Lal wa Sarjangan	Traditional	23	36.7
% increase			15%

* Due to an exceptional growing season, yields were generally high.

[†] Yields were taken from non-participating farmer plots to verify data.

Farmer feedback and lessons learned

- Careful scrutiny of the potato production system allowed for the identification of discrete, simple, low-cost, low-risk changes in practices that had a significant impact on potato productivity and household income and food security.
- The short trainings were sufficient to relay the key messages and behavior changes needed. They were much appreciated by the groups, especially female members.
- Farmers immediately saw the potential to store ware potatoes in the same manner and can now have potatoes available throughout the year.
- Households greatly appreciated the greater flexibility in utilization and sale of their crop.
- The improved seed provided greater resilience to adverse conditions.

Figure 5: Weighing potatoes as they come out of storage



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