

Improved individual ambient ware potato stores are economically viable and can increase incomes of smallholder potato farmers in Uganda

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Introduction

- Potato (*Solanum tuberosum* L.) is a key food and cash crop in Uganda, mainly produced by smallholder farmers in the southwestern and eastern highlands
- Ugandan farmers sell a majority ($\approx 60\%$) of their production immediately after harvest while the remainder is stored primarily for food at home ($\approx 14\%$) or as seed ($\approx 16\%$) for the next cropping season
- Very few farmers ($\approx 3\%$) store potato for selling later as ware potato; this results in seasonal mismatches between potato demand and supply leading to high price fluctuations

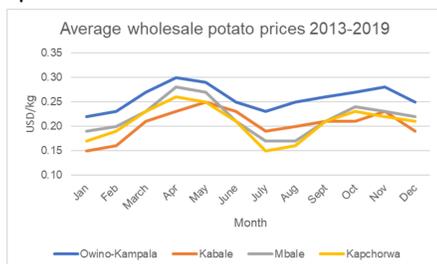


Figure 1: Seasonal wholesale potato price fluctuations in main destination market (Owino-Kampala) and 3 major potato production districts of Uganda (Source: own analysis of Farmgain Africa data).

- Potato farmers tend to use diffused light storage facilities, however, these are suitable only for storing seed potato because light promotes sprouting
- Improved ambient stores have been piloted in Uganda: dark stores, locally available materials, temperature control by taking advantage of the cool temperatures at night, maintenance of the marketability of the stored potato up to 3 months



Figure 2: Improved group ambient ware potato stores piloted in Uganda (50 t storage capacity, 10 years lifespan, unit cost of approximately USD 15,000).



Figure 3: Improved individual ambient ware potato stores piloted in Uganda (8 t storage capacity, 10 years lifespan, unit cost of approximately USD 1,100).

Materials and methods

- Cost-benefit analysis based on data related to operational costs and income of ware potato storage in improved ambient stores and collected for 2 seasons using record keeping templates
- Survey and Focus Group Discussions on the management performance of improved ambient group stores

Results

- Overall high performance of individual stores: 9 out of 10 have a benefit-cost ratio (BCR) > 1 (benefits outweigh costs), 8 out of 10 have a payback period < 5 years, easy to maintain, shared on an informal basis with other farmers from the community to increase storage capacity use
- Overall low performance of group stores: 1 out of 5 has a BCR > 1 , 1 out of 5 has a payback period < 5 years, challenges typical of collective action endeavors (good maintenance of the store; low net cash flow returning to the group; unequal participation of group members; power imbalance resulting in the bulk of stored potato belonging only to a few influential group members, primarily men)

Table 1: Economic analysis of improved ambient ware potato stores (standard deviations in parentheses).

Economic indicators	Individual store (n=10)	Group store (n=5)
Mean total volume annually stored (t)	20.1 (21.5)	71.1 (63.6)
Mean % of maximum installed capacity used	99.1 (80.4)	45.6 (24.8)
Mean storage duration (days)	38.4 (17.0)	34.0 (15.3)
Mean loss during storage (%)	5.8 (5.6)	6.5 (4.5)
Mean operational storage cost/month (USD/kg)	0.012 (0.005)	0.008 (0.006)
Mean farm gate price marketable potato at the start of the storage period (USD/kg)	0.2 (0.1)	0.2 (0.1)
Mean farm gate price marketable potato at the end of the storage period (USD/kg)	0.3 (0.1)	0.3 (0.1)
Mean gross profit (USD/kg)	0.08 (0.03)	0.06 (0.05)
Mean net profit (USD/kg)	0.06 (0.04)	0.02 (0.05)
Mean annual net profit (USD)	1,767 (2,559)	3,227 (8,404)
Mean benefit-cost ratio (BCR)	4.4 (4.5)	1.5 (2.3)
Mean payback period (years)	3.3 (3.9)	9.1* (7.6)

*n=4

- If used for 2 storage seasons a year at full capacity, the profitability of improved ambient stores increases, leading to a significant reduction of the payback period

Table 2: Economic analysis of improved ambient ware potato stores if used for 2 storage seasons a year at full capacity.

Economic indicators	Individual store	Group store
Gross profit (USD/kg)	0.09	0.08
Net profit (USD/kg)	0.07	0.05
Annual net profit (USD)	1,139	5,410
Benefit-cost ratio (BCR)	3.7	2.5
Payback period (years)	0.9	2.2

Conclusions

- Improved individual ambient stores: allow proper storage of ware potato, avoid group management challenges, relatively inexpensive, easy to maintain, highly profitable \rightarrow particularly suitable to increase substantially the income of potato farming households, including female-headed households
- Suggested further actions: more awareness creation on good ware potato production and storage practices, promotion of organizational models combining improved individual ambient ware potato stores with collective marketing initiatives, development of adequate and accessible financial products allowing investment in construction, local capacity development allowing good maintenance of the stores