

Reducing Post Harvest Losses with training and low cost technology: A RCT with small scale farmers

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November 8, 2017

Research Question and Method

- Research question:
 - Are training and the use of hermetic bags technology for maize storage by smallholder farmers economically effective?
- How do we answer:
 - Random assignment of 21 villages to two treatments and the control group
 - Measure the economic impact of interventions on post-harvest physical loss reduction, physical qualities and market price
 - Conduct a cost-benefit analysis for the interventions
- Findings:
 - Both have significant effect in reducing storage losses
 - “Training and hermetic bags”: improved quality, market price and cut down storage protection cost
 - Both are economically feasible

Introduction...

- Increasing concerns on food situation in SSA
 - Rapid population growth
 - Persistently low agricultural productivity
 - Food price volatility
- Solution:
 - Expanding and intensifying food production
- Limitations:
 - Limited land and water sources
 - Increased weather variability
 - Difficulty in adapting to climate change
 - Post Harvest Losses

Introduction...

- Post Harvest Losses (PHL): Loss in food grain between harvest-the moment of human consumption.
- PHL of grain in SSA: 10-20%; equivalent. \$ 4 bil. annually (World bank 2011).
- Reduction of PHL can complement efforts to address food security challenges
- 50% of \$ 940 bil. to eradicate hunger in SSA by 2050 be directed to PHL reduction (FAO-World Bank, 2012)

Motivation...

- Traditional storage cannot guarantee protection of stored products
 - Introduction of the Large Grain Borer in the 1980s
 - Changes in normal weather patterns: moisture content; survival of fungi and weevils
- Consequences:
 - High Post harvest Losses of cereals
 - Undermined food security
 - Sell output immediately after harvest to avoid losses
 - Low market prices for the grain produced
 - Seasonal food shortages
 - Fail to use the harvest as collateral to access credit
 - Susceptible to high food price risks (Saha and Straud 1994)

Previous Interventions

- The Government efforts: construction of community warehouses
 - Available warehouses 1,260 vs actual demand 11,000
 - Many of the warehouses are not accessible:
 - Poor condition
 - Mis-use
- Use of metal silos
 - hermetic technology: introduced to farmers in Africa last decade
 - Effective in controlling maize weevils and the LGB without any pesticide (De Groote et al., 2013; Tefera et al., 2011).
 - BUT
 - High start-up cost
 - Permanently occupy the space whether they are used or not
 - Cannot be easily saved in the bedroom to ensure safety
- Alternative: Low cost hermetic bags technology

Experimental Design

- Sample: Two-step random sampling
 - 21 villages
 - Maize is the main crop produced by the villagers
 - Maize is the main staple food in the village
 - 20 households from each village: 420 maize producing households
- Randomization done at village level: two treatments, one control
- Two treatment groups:
 - “Training and hermetic bags” treatment: Trained on post harvest management practices and received hermetic (airtight) bags. 6 villages (120 subjects)
 - “Training only” treatment: Trained on post harvest management practices but were not given hermetic bags. 6 villages
- The control group continued with the business as usual. 9 villages

Implementation

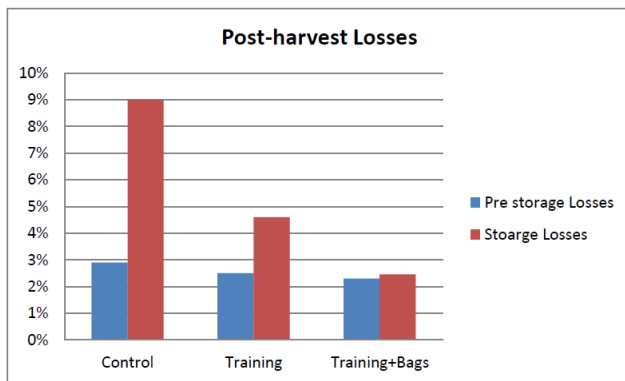
- Baseline survey June-July 2015
- Intervention was done in July 2015
- Content of training covered:
 - Time to harvest;
 - Requirements during the Harvesting Process;
 - Process after Harvesting: Sorting; Drying; Shelling;
 - Storage and storage structures
- The training sessions lasted for about 90-120 mins.
- “Training and hermetic bags” : provided with hermetic bags and trained on using them.

Previous Studies

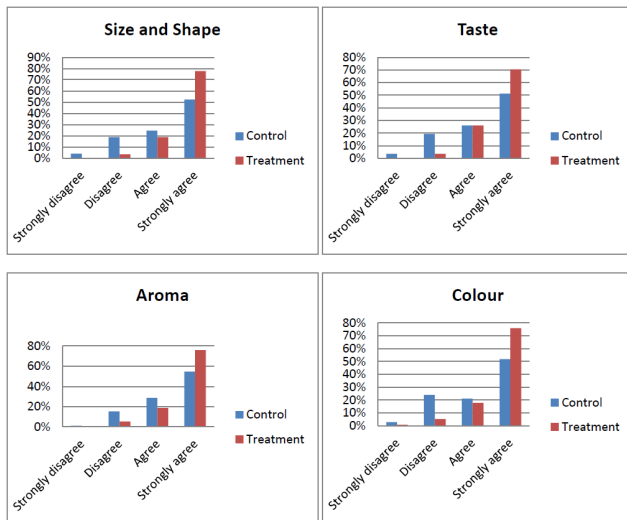
- On-station trials (De Groote et al, 2013; Baoua et al, 2014; Ng'ang'a et al., 2016).
 - Effective in controlling infestation, grain damage and weight loss.
 - Economically beneficial if they last for at least three years
- On-farm trial (Ndegwa et al., 2016)
 - Grain damage: 14% in the control; 4% in the treatment;
 - Weight loss : 1.7% among control farmers; 0.4% in the treated group.
 - Economic if: the bags is used for at least four months per season, the bags last for at least four seasons
- We provide training to farmers before giving bags.
- Consider a longer period; use self-reported estimates
- Consider Benefits beyond PHL reduction and the additional costs

Results

- Both interventions have significant effect in reducing storage losses



Qualitative impacts



Results...

- Training: IRR=14%
- Training + Bags: IRR=35%

Conclusions

- Reduction of Post Harvest Losses can complement efforts to reduce food security
- Economically feasible for small-holder farmers to adopt PHL mitigation technologies
- The introduction of airtight bags should be accompanied with training on post-harvest management.
 - Training of farmers has likely no negative side-effects
 - Subsidized large scale distribution of hermetic bags may have unintended effects.

THANK YOU