



On-Farm Comparison of Maize Post Harvest Technologies in Central Tanzania

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BACKGROUND

In the central Tanzania, post-harvest losses (PHL) in maize from harvest to market range from 15-40%. Major PHL are caused by insect pest during storage. Storage pests can be controlled by insecticides but these can alter the taste of the grains and pose health hazards. Hermetic storage (metal silos, plastic barrels, hermetic bags) without use of insecticides is an alternative technology to control storage insect pests.

However, hermetic storage structures (e.g. metal silo) have not been tested yet in Tanzania under conditions of smallholder farms and managed by farmers.

OBJECTIVES

To test the effectiveness and acceptance of different storage technologies for maize under conditions of smallholder farms in central Tanzania with a particular emphasis on hermetic storage.

POSTHARVEST TECHNOLOGIES & TRIAL DESIGN

A trial was conducted in two villages each in Dodoma and Manyara regions involving a total of 20 smallholder farmers. Each farmer compared the following eight technologies over a period of 30 weeks:

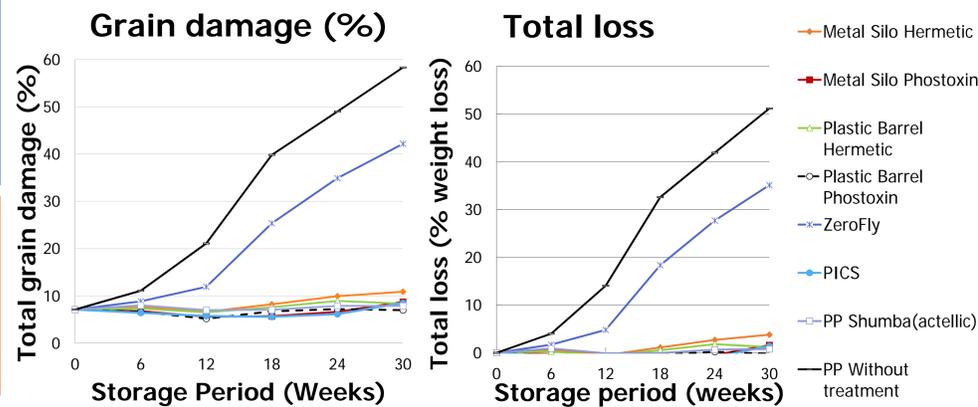
- 1) Metal Silo Hermetic:** Hermetic storage of untreated maize in flat-topped metal cylinder made of galvanized steel (160 cm height, 80 cm diameter)
- 2) Metal Silo Phostoxin:** As above but maize treated with phostoxin (aluminium phosphide) at beginning of storage.
- 3) Plastic Barrel Hermetic:** Hermetic storage of untreated maize in flat-topped plastic (HDPE) barrel, (100 cm height, 50 cm diameter). Adapted with bigger top inlet and metal lid with rubber lining for hermetic sealing.
- 4) Plastic Barrel Phostoxin:** As above but maize treated with phostoxin at beginning of storage.
- 5) PICS bag:** Hermetic storage of untreated maize in triple layer Purdue Improved Crop Storage (PICS®) bag.
- 6) ZeroFly® bag:** Non-hermetic storage of untreated maize in ZeroFly® storage bag (Deltamethrin treated yarn)
- 7) PP Shumba:** Non-hermetic storage of maize treated with Actellic Super® (Pirimiphos-methyl 16 g/kg plus Permethrin 3 g/kg; local name Shumba) in commonly used polypropylene bag.
- 8) PP without treatment:** Non-hermetic storage of untreated maize in commonly used polypropylene bag (control).



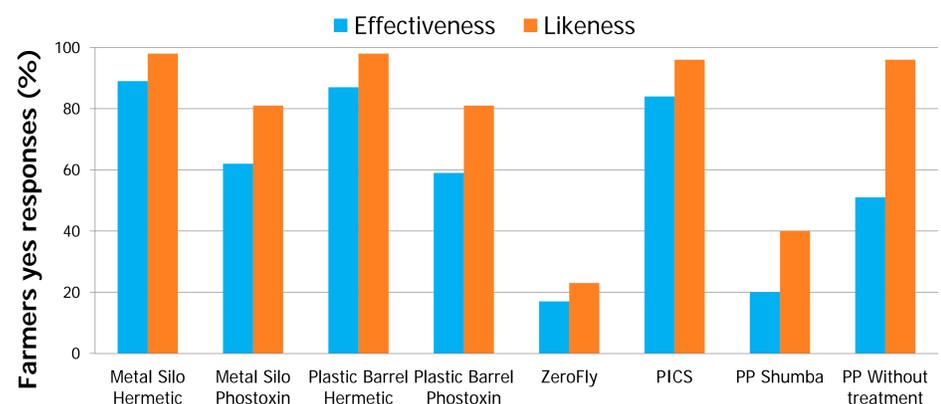
RESULTS

Insect pests: The dominant insect pests identified in the stored grains were the Maize weevil (*Sitophilus zeamais*) and Red flour beetle (*Tribolium castaneum*). All hermetic storage technologies and the use of Actellic in PP bags were effective in controlling insect population during storage. The ZeroFly® bag did not effectively control insect population under farmers' management.

Grain damage and weight loss: Grain damage and weight loss of untreated maize in ZeroFly® and PP bags without treatment were significantly higher ($p < 0.05$) at 30 week of storage compared to the other storage treatments. Insect damage accounted for the largest portion (52-86%) of grain damage observed in all the storage treatments.



Farmers' perception: Farmers rated the hermetic storage technologies (metal silo, plastic barrel and PICS bags) without insecticide application as most effective to control storage pests.



However, different to trial results, PP Shumba was not rated as effective.

Farmers liked the same hermetic technologies best. Metal silos were preferred compared to plastic barrels. Even though PP bags without insecticide application did not control storage pests, farmers still liked them due to being a cheap technology. PP Shumba and above all ZeroFly® bags were liked the least. Farmers indicated that the Shumba treatment alters the taste of grain.

CONCLUSIONS & RECOMMENDATIONS

- All hermetic storage techniques tested were effective in preventing maize damage by insects for a storage period of 30 weeks (7 months).
- Farmers rated hermetic storage technologies as effective to control storage pests, and they showed a high acceptance for them.
- Application of Shumba is effective to control storage pests but is not liked by farmers because it alters the taste of the grain.
- Hence **hermetic storage alone can be recommended to farmers provided** :
 - high quality of technologies is ensured i.e. metal silo and plastic barrel are hermetic and
 - sound handling and management of the technologies by farmers i.e. proper placement (shade, dry) and hermetic sealing of lids.
- Re-infestation of insects during intermittent opening of hermetic containers by farmers to take out food during storage must be avoided irrespective whether maize is initially treated with insecticide/fumigated or not.

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