Evidence Brief

Transforming African agriculture through sustainable intensification | November 2016

Reducing the high cyclical losses after harvest in northern Ghana

Addressing the neglected input in the production chain

Farmers pose with PICS bags *Photo credit: IITA*

Key messages

- It is possible to keep post-harvest losses down to around 0 to 7% using PICS sacs and plastic drums.
- There is demand within the communities for improved on-farm storage technologies like Perdue Improved Crop Storage (PICS) sacs and plastic drums.
- Use of jute sacs, the common method of storage across communities in northern Ghana, leads to high losses ranging from 39.5 to 77.2% after 12 months of storage.

The issue

In Ghana, high postharvest losses, irresponsible use of agrochemicals, and inadequate knowledge of good storage operations have been identified as significant constraints during crop storage. Currently, the Ministry of Food and Agriculture in Ghana estimate that post-harvest losses account for up to 10-20% of grain loss across dry cereals and 20-40% in fruit and vegetables. Insect pests, rodents and grain molds are identified as the most critical challenges in storing dry cereals.

A myriad of insects broadly described as weevils are the major insect pests encountered in storage. The often common insects pests include: red flour beetle, Tribolium castaneum (Herbst); larger grain borer, Prostephanus truncatus Horn; lesser grain borer, Rhyzopertha dominica F.; maize weevil, Sitophilus zeamais Motschulsky; granary weevil, S. Granaries L., Angoumois grain moth, Sitotroga cerealella (Olivier), and cowpea weevil, Callosobruchus maculatus F.

In most instances, farmers apply a cocktail of pesticides to protect their grain when prolonged storage is envisaged or when insect infestation is noticed during storage. Most farmers acquire storage pesticides from non-accredited input dealers without prior training on appropriate use. Indiscriminate use of common grain protectants viz Actellic Super (pirimiphos methyl), bioresmethrin

(pyrethroid), Campha, Wonder 55, and phostoxin (aluminum phosphate) is widely reported.

In this 2nd year of collaborative work, we designed experiments and trainings to address some of these knowledge and technical gaps to manage harvest surpluses. We provided information and demonstrations on integrated pest management and good storage operations to reduce on-farm storage losses. We specifically:

- Out-scaled improved technologies to manage major insect pests during prolonged storage of dry cereal grains and pulses.
- Trained farmers, farmer-based organizations and Agricultural Extension Agents on proper postharvest practices for dry cereal grains and pulses.

Findings

- The study demonstrated that it is possible to keep postharvest losses down to around 0 to 7% using the two hermitic methods evaluated. However, we still emphasize the critical role of good pre-harvest operations drying, and clean grain prior to storage.
- Overall losses in jute sacs, the common method of storage ranged from 39.5 to 77.2% at 12 months after storage across communities. Losses in the two improved hermetic storage methods ranged from 0.00 to 0.5 % in Northern and 0.1 to 7.6% in the Upper East regions. The treatment effect showed no significant difference between phostoxin and actellic, but the two types of protection were consistently better than the control.

Table 1: Extent of reduction in postharvest losses (%) of maize after 12 months of storage in Northern Region

Storage Method	Protection Method	Communities			
		Botingli	Gbanjong	Tibali	Tiborgnayili
Jute	Control	69.8	75.6	39.5	70.5
	Actellic	72.6	74.4	61.8	67.2
	Phostixin	76.3	77.2	56.5	69.7
PICS	Control	0.00	0.50	0.00	0.29
	Actellic	0.19	0.20	0.50	0.19
	Phostixin	0.00	0.19	0.00	0.23
Plastic drums	Control	0.00	0.31	0.40	0.19
	Actellic	0.00	0.30	0.00	0.21
	Phostixin	0.00	0.30	0.00	0.70

LSD 0.05 (Community * Storage method * protection)= 4.5

Table 2: Effect of storage method and grain protectants on the extent of reduction in postharvest losses (%) of maize after 12 months of storage in Upper East Region

Storage method	Protectant	Communities			Mean
		Bonia	Tekeru	Samboligo	
Jute sacs	Control	6.64	1.08	17.94	8.55
	Actellic Supper	0.95	0.39	0.56	0.63
	Phostoxin	0.46	2.08	7.56	3.37
PICS sacs	Control	1.38	0.1	0.4	0.63
	Actellic Supper	0.37	0.93	0.14	0.48
	Phostoxin	0.27	0.89	1.18	0.70
Plastic drum	Control	0.07	0.31	1.70	0.69
	Actellic Supper	0.37	1.2	0.56	0.66
	Phostoxin	0.00	0.87	7.56	0.38
	Mean	1.15	0.87	3.35	1.79

LSD 0.05 (Community * Storage method * protection)= NS

Recommendations

Postharvest interventions like PICS sacs and plastic drums, with or without grain protectants, should be used in the communities to reduce on-farm storage losses.

Methodology

A participatory on-farm trial was conducted to compare three storage methods and protectants (Table 1 and 2) on storage losses in maize under farmer storage units. The plastic drums are ordinary containers which are mostly utilized in household water storage. They have an air-tight seal which provide hermitic conditions for grain stored. Two common grain protectants: Actellic Super EC and phostoxin were applied at recommended rates of the manufacturers. Actellic Super EC is a food-grade chemical containing 80 g Pirimiphos-methyl and 15g Permithrin/L as emulsifiable concentrate. Phostoxin is a food-grade fumigant.

The Africa Research In Sustainable Intensification for the Next Generation (Africa RISING) program comprises three research-for-development projects supported by the United States Agency for International Development as part of the U.S. government's Feed the Future initiative.

Through action research and development partnerships, Africa RISING will create opportunities for smallholder farm households to move out of hunger and poverty through sustainably intensified farming systems that improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three projects are led by the International Institute of Tropical Agriculture (in West Africa and East and Southern Africa) and the International Livestock Research Institute (in the Ethiopian Highlands). The International Food Policy Research Institute leads an associated project on monitoring, evaluation and impact assessment.

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