



**A NOVEL APPROACH TO REDUCTION OF
TOXIGENIC *ASPERGILLUS FLAVUS* LEVEL IN
MAIZE USING DIFFERENT TRADITIONAL
DRYING TECHNIQUE**

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**2016 AUTUMN INTERNATIONAL (Food Safety & Security) 18th
May 2016
Johannesburg, South Africa**

Introduction



- Maize is part of the world's important food grain
- It is a basic staple food grain for large parts of world including Africa, Latin America, and Asia (Yaouba *et al.*, 2012)
- Maize is a major important cereal being cultivated in the rainforest and the derived Savannah zones of Nigeria. Maize has been in the diet of Nigerian's for centuries
- It started as a subsistence crop and has gradually become more important crop. Maize has now risen to a commercial crop on which many agro-based industries depend on as raw materials. (Iken and Amusa, 2004)
- It can be processed into different food, beverages and feed ingredients serving as a source of food to both human and livestock.

Close to 50% of the crop is lost due to inefficient post harvest management

Losses in Maize can be of two types:

Quantity Loss	Quality Loss
· Improper time of harvesting	· Change in colour, smell or taste
· Inconsistent Harvest technology (Thrashing & shelling)	· Contamination with toxins
· Improper drying methods	· Pathogen
· Spillage during storage	· Insect excreta
· Damage caused by pest organism (Aflatoxin)	· Reduction in nutritional value
· Poor handling	
· Damage caused due to rodents	

The losses above can be summarized by two main causes:

- a) Shelling and Drying Techniques (Moisture content)
- b) Storage and Handling

Lower the
moisture
content, less the
damage

- ❖ Low moisture content and low storage temperatures reduce the opportunity for deterioration and microbial growth
 - ❖ Lack of access to technologies and use of indigenous / improper drying methods can however induce the formation of stress cracks, puffiness and discoloration or leave higher moisture content than desired
 - ❖ Drying also leads to weight reduction which can create conflict of interest for the seller (farmer / trader)
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Maize grains are
subject to
infection

- Maize grains are subject to infection by a variety of toxigenic fungi, most commonly *Aspergillus spp*, *Fusarium spp*, *Alternaria spp*, and *Penicillium spp*
- Fungal contamination of stored commodities is a very serious problem in tropical warm regions of the world (Shubhi *et al*, 2010)
- Contamination with fungi diminishes the quality of grain because toxigenic fungi species produces a highly toxic compound known as mycotoxin

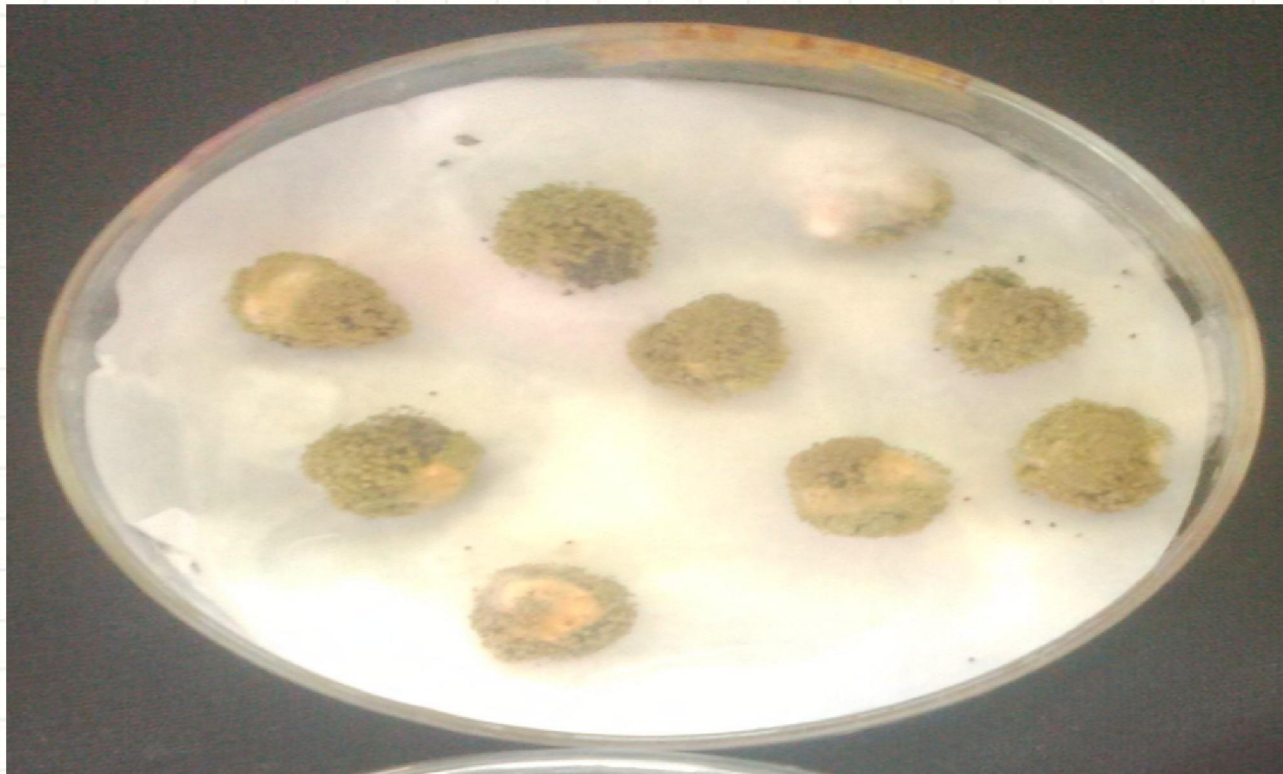
The aim of
the
research;

- Develop a cost effective method of drying maize for improvement of post harvest losses
- Determine the best and most efficient method of drying maize grains that will reduce the sporulation level of the toxigenic *Aspergillus flavus*
- using solar dryer lined with aluminum foil, solar dryer lined with black polythene, tray lined with plantain (*Musa paradisiaca*) leaf, tray lined with *Thaumatococcus danielli* leaf and calabash

- Preparation of spore suspension of *Aspergillus flavus*
- Inoculation of the maize sample with the toxigenic *Aspergillus flavus*
- Drying of the inoculated maize using the various method
- After incubation of all the spores on the maize grains for 18hours, the inoculated maize grain were dried on the different drying methods for 3 weeks
- Spores were counted at weekly interval
- Incubation of the inoculated maize grain from the various drying and storing method in a humidity chamber for seven days



maize sample inoculated with the toxigenic *Aspergillus flavus*



Incubation of the inoculated maize grain from the various drying method in a humidity chamber.

Drying method

Number	Drying method
1	Solar dryer lined with aluminium foil
2	Solar dryer lined with black polythene
3	Tray lined with <i>Thaumatococcus daniellii</i>
4	Tray lined with plantain (<i>Musa paradisiaca</i>)
5	



plantain (*Musa paradisiaca*) leaf



Thaumtoccoccus daniellii

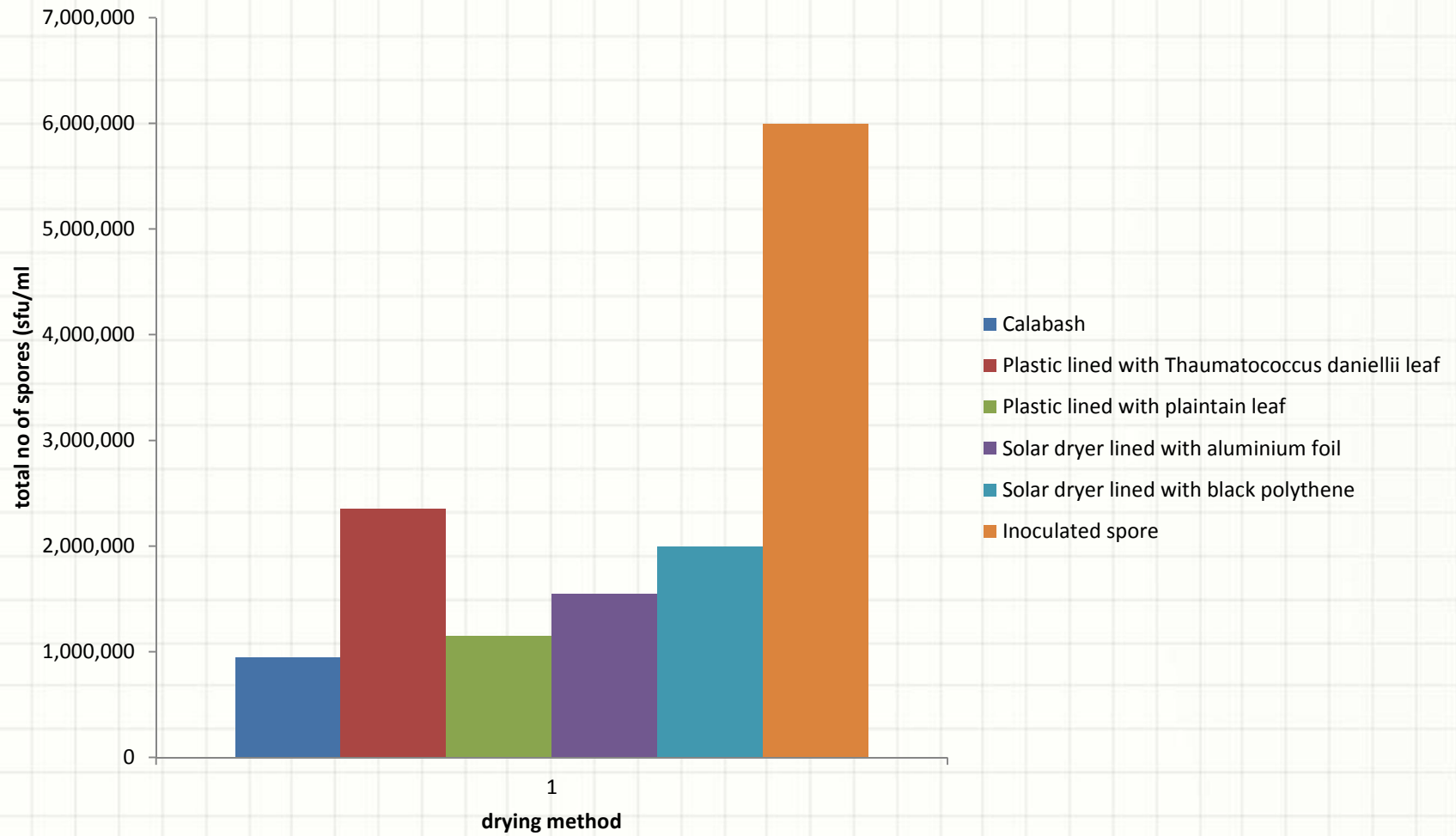


Solar dryer lined with black polythene



Solar dryer lined with aluminium foil

Result



Discussion

- The low sporulation observed in the maize dried with calabash and solar dryer lined with aluminium foil was because the temperature of the drying surface was not as high as the temperature of the other dryer since surface of the dryers did not provide the necessary conditions for further growth of the fungus as proposed by Egal *et al.*,2005
- **use of traditional calabash and solar dryer lined with aluminium foil were very effective in reducing toxigenic *Aspergillus flavus* levels in maize.**

ADVICE

- Avoidance of Mycotoxin formation is best in every case
- The use of solar dryer lined with aluminum foil should be promoted among small holders farmers
- **Raise awareness** of aflatoxin among policy makers.
- Recommend routine **monitoring of mycotoxins and mould contamination in crops**
- Develop guidelines for controlling mycotoxins in **agricultural production.**

THANK YOU

