Assessment of PHL in maize due to Aflatoxin Contamination in SW-Ethiopia

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INTRODUCTION

Maize is a crop cultivated in diverse climate and used as food, income and feed for resource poor smallholders producers and consumers in Ethiopia. Despite its potential and leading crop in its productivity and area coverage in Ethiopia, particularly Jimma zone, where the farming practices is characterized by fragmented small holder production but highly consumed at different stage of maturity, absences of processing center in the area, the crop is subjected to high post harvest loss due to poor post harvest management practices. Efficient post harvest management of maize depends basically on ecological conditions of storage, including physical, chemical and biological characteristics of the grain and as well as storage duration, type and characteristics facility. Stored maize grains fungal pathogens are classified among major factor resulted in both quantity and quality loss of the grains in the store. Therefore, the project was initiated with aim to assess storage technology, post harvest fungal pathogen and their effect on quality in maize at farmers, collectors and whole sellers storage condition in selected districts of Jimma Zone, Ethiopia. Furthermore, the project address reduction of maize post harvest loss using a gender lens in analyzing the situation of small-holder farmers contributes to the development of demand-driven solutions that consider and address the needs, constraints, opportunities and capacities of both men and women farmers in the study area.

Materials and Methods

Multistage sampling technique was employed to select five districts, representing of maize producing agro-ecologies. In each of the districts three peasant associations from which 45 produces, 15 collectors and 3 whole sellers were systematically selected. Grain samples were collected every month until stored product was depleted to asses role of postharvest fungal pathogen. Maize grain moisture content was determined on spot using digital calibrated moisture tester. Fungal identification was done by means of morphological characterization. High Performance Liquid Chromatography was used for detection and quantification of aflatoxin. Semi-structured questionnaires were prepared to document all available storage technologies from producers, collectors and whole sellers, as in total 329 respondents interviewed. Like wise, 211 respondents were interviewed to document Quantitative and qualitative data to address gender role in post harvest management of maize along value chain.

Result and Discussion

Moisture content of maize grains ranged up to 29% during harvest and loading stage, which is higher than the recommended content. However, during 1st month of storage start to decrease but prolonged storage duration, moisture content increased especially, in rainy season (Fig. 1). Up to 50% mould incidence per cobs recorded from study areas (Fig. 2). Aflatoxin analysis result indicated that 3.33% of the total samples tested showed positive result, with maximum concentrations of 5.16, 38.79, 7.56, and 41.08 and 92.59 µg/kg of aflatoxin G2, G1, B2, B1 and total aflatoxin concentration, respectively.

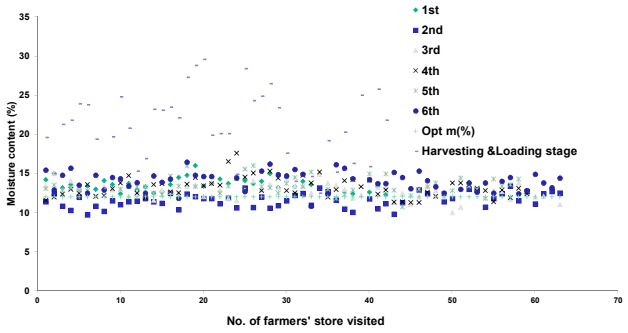

Figure 1. Moisture content of maize grains at harvest and loading stage, and subsequent monthly interval data for six month stored maize grains

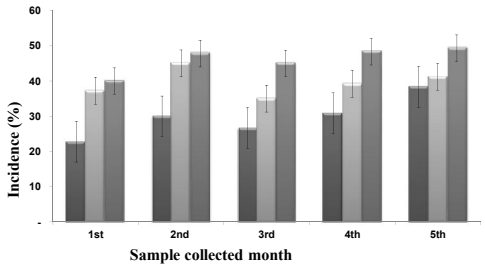

Figure 2. Mould incidence occurrence per cobs at Sokoru district of Jimma zone, SW Ethiopia.

Fusarium spp., *Penicillium* spp., *Aspergillus* spp., *Colletotricum* spp., *Geotricum* spp., *Cladosporium* spp. and *Drechslera* spp were fungal genera isolated and identified with different frequency of occurrence along producers, collectors and wholesalers stored maize grains (Fig. 3 & 4).

Figure 2. Indicate different fungal genera produce different colors on growth media

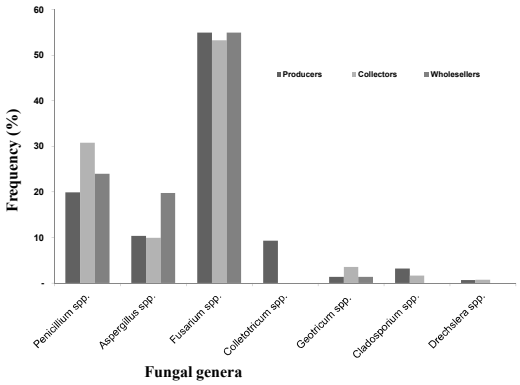

Figure 1. Fungal genera occurrence at producers, collectors and whole sellers storage conditions.

Traditionally, post harvest activities are considered to be responsibility of women in the area as result exposes the crop subjected to high post harvest loss complemented with poor storage structure. Producer, retailer/collector and wholesaler where the only maize sector actors were the share value were 89.10%, 2.40% and 8.50% respectively. There is no formal maize value chain in the zone but many informal short term and seasonal functioning chains expose the crop to high post harvest loss and traders to shift to other crop due to loss.

Figure 4. Respondents interviewed to generate local information

Recommendation

This research highlights, the need for further evaluation of storage technologies for climatic variables that favor mycotoxin producing fungi to design appropriate storage structure. Further investigation also required to understand the multiple mycotoxins profile along the maize value chain. Moisture content of maize grains at harvest and loading stage showed unsafe for storage and need intervention to minimize fungal growth in the store. Consideration of different social set up like gender division of labor in the society in reducing postharvest loss and adding value activities is important for future action.

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