ASPERGILLUS FLAVUS CONTAMINATION IN MAIZE DURING POSTHARVEST PROCESS

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ABSTRACT

The contamination of maize by Aspergillus flavus was investigated from farmers' fields through middlemen storages. Maize ears (moisture content 24.8%) were stored in farmer's storage straightly from the field without sun drying nor grading. A. flavus contamination of these ears in the field was low (0%) and was remained at low level (0.5-1%) even after 67 days since harvest. Maize ears (m.c. = 28.6% and 26.6%) which were contaminated by A. flavus in the field (10% and 1%) were able to be stored with low contamination of A. flavus (2% and 0.5%) for 76 days if ears were sun dried (m.c. = 17% and 22.3%) and graded properly before storage. Grain which were sun dried immediately after mechanical shelling on concrete drying floor with moisture content less than or around 15% was abled to be stored with low contamination of A. flavus (1.5%-8%) for 56 days in middlemen's storages. Those grain which were not dried after mechanical shelling, A. flavus contamination prevailed quickly if moisture content was over 20%. However if moisture content was less than 17% the spread of A. flavus was suppressed.

Introduction

Recently, there are many reports in Thailand which showed that aflatoxin contamination of maize increase when maize is distributed from fields to farmers' storages then to local middlemen and finally to silos and feed factories (1-4). However it is not always clear that why and how the contamination occur. The purpose of this study is to pinpoint the process where A. flavus contamination take place. Three tons of maize were traced from fields through farmers' storages and middlemen storages during 76 days.

Materials and Methods

Matured maize ears was harvested around one ton from each farmers. In the first and second farmers maize ears were sundried on iron drying bed and bamboo drying bed for 9 and 8 days. Then maize ears were graded and molded ears were eliminated and stored in farmers' storages for 11 days. In the third farmers, maize ears was stored in farmer's storage for 11 days without drying nor grading.

After stored in farmers' storages for 11 days maize ears from each farmers were divided into four groups. Maize ears in the first group was stored successively in farmers' storages for 56 days. Second group, maize ears was mechanically shelled, sun dried on concrete floor and kept in gunny bags in middlemens' storage for 56 days. Third group, mechanically shelled grain was stored as well as the second group but without drying. In the last group, grain was hand shelled and stored in gunny bags in middlemens' storage without drying for 56 days. After mechanically shelled, grain from the first and second farmer were dried on the first middleman's concrete floor for 3.5 hours. Grain from the third farmer was dried in another middleman's drying floor for 5 hours.

Shelled grain and maize ears (5-7 kg. of grain) were collected during sun drying and storage and grain were examined for A. flavus contamination by surface sterilizing 1 min with 3% NaOCl, washing 5 times with sterile distilled water and plate on PDA which contained 30 ml/l of rose bengal and 30 mg/l of chloramphenicol and were incubate 5 days at 28-30°C. Moisture content was measured in every sample by using Steinlite moisture meter model 90 (The Fred Stein Laboratories).

Result and Discussions

Storing maize ears in farmers' storages :

Maize ears from the first two farmers (m.c. at harvest = 28.6% and 26.6%) which were contaminated with A. flavus (10% and 1% of grain) in the field can be stored for 76 days with low contamination of A. flavus (2% and 0.5%) if maize ears were sun dried (m.c. = 17% and 22.3%) and graded properly before storage. In the third farmer, there was no contamination of A. flavus at harvest and after harvest maize ears were stored in the storage without sun drying nor grading and there was very low contamination of A. flavus (2.5%) even after 76 days.

Maize grain from all three farmers that were mechanically shelled and dried on middlemen's concrete floor for 3.5-5 hours moisture content were decreased down to 13.7%, 15.0% and 15.2%. These grain were stored in gunny bags in middlemen's storages for 56 days with low contamination of A. flavus 6.5%, 8% and 1.5% respectively.

On the contrary, after mechanical shelling if grain were not dried and moisture content are 17%, 20.3% and 20.1% percent of A. flavus contamination after stored grain in gunny bags for 14 days were 8.0%, 46.5% and 97.5% respectively.

In the last group, maize ears that were shelled by hand and kept in gunny bags in middlemen's storages for 14 days without drying (m.c. = 17.4%, 19.5% and 22.1%) showed A. flavus contamination of 3.5%, 2.5% and 100% respectively.

Results of this study clearly showed that A. flavus contamination in maize ears was lowered than that in grain at the same moisture content. The contamination of A. flavus was deeply concerned with the moisture content of the kernel and also damage caused during shelling process. When moisture content was less than 17% the spread of A. flavus was not occurred but prevailed quickly if moisture content was over 20%.

References

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