

Postharvest Mycotoxin Contamination in Maize: Microbiological Insights from Ghana

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INTRODUCTION & AIM

Maize is a major staple crop in Ghana and forms a vital part of household food security. Yet, poor postharvest handling and storage make it vulnerable to fungal infestation and mycotoxin contamination. Mycotoxins such as aflatoxins and fumonisins are toxic secondary metabolites that threaten human and animal health, leading to liver cancer, immune suppression, and stunted growth. In many rural areas, maize is stored under high humidity, poor ventilation, and inadequate hygiene—conditions that favor fungal growth and toxin production. Despite growing awareness, data on the microbial ecology and contamination levels in traditional storage systems remain limited. This study investigates the fungal species responsible for maize contamination in selected regions of Ghana and identifies the environmental and storage factors contributing to mycotoxin risk.

METHOD

Design

The study employed an experimental field design involving the collection and microbiological analysis of stored maize samples from selected farming communities in Ghana. The approach focused on identifying fungal contaminants and determining the relationship between storage conditions and mycotoxin levels.

Study Sites and Sampling

Maize samples were collected from 60 smallholder farmers across five rural communities in the Eastern and Ashanti regions of Ghana. Each sample represented a different storage method (e.g., traditional granaries, sacks, and household storage).

Laboratory Analysis

Fungal isolation and identification were performed using the pour plate and serial dilution methods on Potato Dextrose Agar (PDA). Plates were incubated at 25–28 °C for 5–7 days. Colonies were identified based on morphology and microscopic features, focusing on *Aspergillus* and *Fusarium* species.

Environmental and Storage Conditions

Data on moisture content, temperature, and ventilation were recorded using digital meters and standardized observation checklists. These factors were analyzed to assess their correlation with fungal presence and mycotoxin levels.

Data Analysis

Descriptive and inferential statistical analyses were conducted to determine relationships between storage conditions, fungal load, and toxin production. Results were validated through laboratory replication and cross-checking.

RESULTS & DISCUSSION

The study aimed to identify fungal contaminants in stored maize and examine how postharvest conditions contribute to mycotoxin production. *Aspergillus flavus* and *Fusarium verticillioides* were the dominant fungi detected. Aflatoxin B₁ and fumonisin B₁ were the main toxins found. Over **70%** of maize samples exceeded the safe aflatoxin limit, and **60%** contained fumonisin contamination.



Poor ventilation, high humidity, and traditional storage practices were strongly linked to higher fungal loads and toxin levels. These findings show that postharvest handling and storage environments are key drivers of contamination. They also align with earlier studies showing that moisture and storage structures affect fungal growth. Improving drying, aeration, and farmer education can help reduce contamination and improve food safety in maize-dependent communities.

CONCLUSION

This study revealed that poor storage conditions, high humidity, and inadequate ventilation significantly increase fungal growth and mycotoxin contamination in maize. The dominance of *Aspergillus flavus* and *Fusarium verticillioides* highlights the urgent need for improved postharvest handling practices among smallholder farmers in Ghana. Effective moisture control, proper drying, and good aeration are critical in reducing contamination risks. To address these challenges, farmers should be trained in safe postharvest and storage methods, while communities are educated about the health risks of mycotoxins. Regular monitoring of stored maize and the use of improved, ventilated storage structures can further minimize toxin buildup. In addition, supportive policies and access to affordable storage and drying technologies will be essential for protecting public health and ensuring food safety in maize-dependent communities.

FUTURE WORK / REFERENCES

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