Mitigating Aflatoxin Risks in Maize: Climate Factors and Integrated Management Appproaches

林桂英 (5127)

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Outline

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Abstract

Maize (*Zea mays* L.) is one of the most economically critical crops worldwide, serving as a fundamental food source for humans and a major component of livestock feed. However, it is highly susceptible to mycotoxin contamination, particularly from toxigenic *Aspergillus* species that produce aflatoxins. These toxins pose serious health risks and economic losses, especially in regions with warm temperatures and fluctuating climatic conditions. Environmental factors such as rainfall and temperature strongly influence the extent of aflatoxin contamination. Although preharvest control measures can effectively reduce toxin levels, improper postharvest handling can still facilitate fungal growth and aflatoxin accumulation. The first study analyzed maize samples from six agro-climatic regions in South Africa and found that drought and reduced rainfall significantly increased aflatoxin levels. The second study investigated aflatoxin B1 (AFB1) contamination levels in maize collected at preharvest and postharvest stages across seven agro-climatic regions in Tamil Nadu, India. It showed that 28% of samples contained AFB1, with several exceeding regulatory limits due to high moisture and inadequate storage conditions. Although fungicides can reduce aflatoxin contamination, they have a residual effect on human health and the environment. Extract from plants or medicinal plants can be an alternative solution to reduce aflatoxin contamination. Both studies emphasize that integrated preharvest and postharvest management practices are essential for minimizing aflatoxin contamination. Together, these findings underscore the strong influence of environmental stress on fungal proliferation and highlight the importance of adopting comprehensive strategies, including biocontrol applications, proper drying techniques, improved storage, and climate-adaptive agricultural practices. This report aims to summarize the key outcomes of both studies and discuss their implications for enhancing food safety and strengthening agricultural resilience.

References

Karthikeyan, M., Dhanabalan, S. P., Shanmugavel, B., Jaffer, S. B., Marimuthu, S., Radhika, K., Nagappan, E., Johnson, I., & Periyannan, S. (2025). Aflatoxin evaluation and integrated management strategies to minimize toxin contamination in maize and peanuts. *Journal of Agriculture and Food Research*, *21*, 101809.

Nji, Q. N., Babalola, O. O., & Mwanza, M. (2024). Climatic effects on aflatoxin contamination of maize. *Toxicology Reports*, *13*, 101711.