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The dry chain: Reducing postharvest losses and improving food safety in humid climates

Kent J. Bradford, Peetambar Dahal, Johan Van Asbrouck, Keshavulu Kunusoth, Pedro Bello, James Thompson, Felicia Wu



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Abstract

Background

Even as increasing populations put pressure on food supplies, about one-third of the total food produced for human consumption is wasted, with the majority of loss in developing countries occurring between harvest and the consumer. Controlling product dryness is the most critical factor for maintaining quality in stored non-perishable foods. The high relative humidity prevalent in humid climates elevates the moisture content of dried commodities stored in porous woven bags, enabling fungal and insect infestations. Mycotoxins (e.g., aflatoxin) produced by fungi in insufficiently dried food commodities affect 4.5 billion people worldwide.

Scope and Approach

We introduce the term “dry chain” to describe initial dehydration of durable commodities to levels preventing fungal growth followed by storage in moisture-proof containers. This is analogous to the “cold chain” in which continuous refrigeration is used to preserve quality in the fresh produce industry. However, in the case of the dry chain, no further equipment or energy input is required to maintain product quality after initial drying as long as the integrity of the storage container is preserved. In some locations/seasons, only packaging is required to implement a “climate smart” dry chain, while in humid conditions, additional drying is required and desiccant-based drying methods have unique advantages.

Key Findings and Conclusions

We propose both climate-based and drying-based approaches to implement the dry chain to minimize mycotoxin accumulation and insect infestations in dry products, reduce food loss, improve food quality, safety and security, and protect public health.

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