Dry Chain Is a Social Preventive Intervention Tool for Liver Cancer by Minimizing Aflatoxins in Dry Foods

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Aim

To bring global awareness about the primary preventive nutrient sensitive "dry chain" strategy to minimize liver cancer linked to aflatoxins in dry food products.

Introduction

Better food safety, security, nutrition and health are global concerns as the population increases to 10 billion by 2050. Agriculturalists have focused on increasing crop yields to meet growing demand for food. However, FAO estimates that about one-third of the total food produced, including dry foods, is lost or wasted, creating food safety and security concerns. Natural disasters like floods and earthquakes also pose quality management problems for food stakeholders. Medical research has called for improvement in dry food product storage to minimize dietary exposure to mycotoxins (aflatoxins) that lead to poor nutrition and health problems including liver cancer. Low moisture content (MC) has long been identified as critical factor that has enabled safe product storage in pharmaceutical, processed food and seed industries in developed countries. However, an integrated approach to manage dry food products to minimize dietary exposure to carcinogenic aflatoxins in humid regions/seasons is urgently needed in developing countries.

Methods

Moisture contents of dry food products were measured before the rainfall in breadbasket regions of India, Nepal and Thailand. Airport weather data were also analyzed for India, Pakistan, China, Thailand, several African and South American countries. Use of a regenerable desiccant was tested for drying horticultural and some agronomic seeds in south Asia and Africa known to have aflatoxin and insect prevalence. Natural drying was also tested in Punjab and Telangana (India), south Nepal and north Thailand.

Nutrient sensitive pesticide-free Dry Chain concept scaled out while using desiccants

Cold Chain: High moisture and continuous cooling needed to extend shelf life

Dry Chain: Dry to "Processing moisture content" and pack into hermetic containers

Storing cold after drying is best to minimize quality/nutrient loss, but warm conditions also work for medium term hermetic storage

When drying is feasible in dry seasons, food products could be dried during daytime (low RH) and covered with a tarp at nights (high RH) until achieving safe or processing MC and then be packaged into hermetic containers until processed or consumed.

Dry Chain

Dry food products seem to 'suitability' for traditional processing MC (11-15%) and use desiccants (air tight)

Monitor quality/aflatoxins in food/feed value chain

Conclusions

Dry food loss in storage occurs due to infestation by molds and insects. Toxigenic fungi can grow in storage and cause food safety concerns in humid seasons/regions. High moisture content of foods favors such damage, pointing to moisture as the primary storage culprit. Pharmaceutical, processed food and seed industries protect dry products from moisture during storage and transport. A unifying Dry Chain concept is presented that uses natural and artificial drying followed by moisture-proof packaging to minimize mycotoxin prevalence in the food/feed value chain.

Results

Molds and insects cause extensive dry food loss

Dry Chain

Dry food products seem to 'suitability' for traditional processing MC (13-15%) and use desiccants (air tight)

Monitor quality/aflatoxins in food/feed value chain

Bibliography


Acknowledgments

http://www.nutritioninnovationlab.org/event-post/2013-scientific-symposium/

Further Information

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