

Prevention by essential oils of *Aspergillus flavus* growth and aflatoxin B₁ production: Mini review

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Aspergillus flavus has been reported to be the most common fungal food commodities. Under conditions of high humidity and moderate temperature, this fungus may have the potential to produce Aflatoxin B₁ (AFB₁) which is reported as the most hepatotoxic, teratogenic, mutagenic and immunosuppressive of the four major aflatoxins (B₁, B₂, G₁ and G₂) to human being and other livestock (Fig.1). AFB₁ is metabolized through the cytochrome P450 enzyme system into highly reactive metabolite AFB₁-8, 9-exo-epoxide that interacts with cellular macromolecules, particularly proteins and DNA inducing cell damages (Fig. 2). AFB₁ can be also converted to other derivatives (AFM₁, AFP₁, AFQ₁, and aflatoxicol). AFB₁ affects cereals and their derivatives, oil seeds, nuts, dry fruits, spices, legumes, fruits, milk and milk derivatives which reaches consumers either by direct contamination of plant materials or products, or by “carry over” because it is resistant to heat and normal industrial processing.

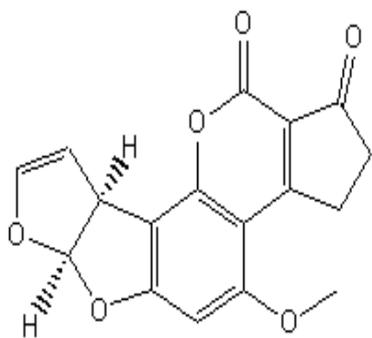


Fig 1 Chemical structure of AFB₁.

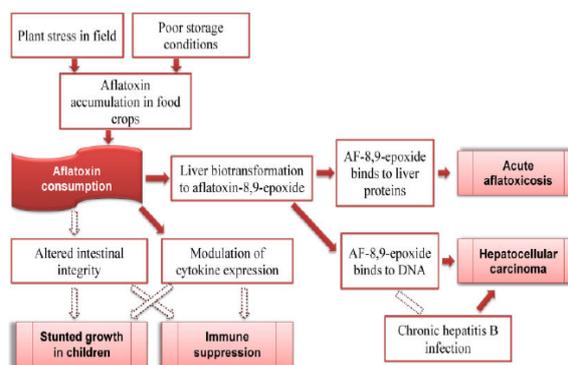


Fig. 2 Aflatoxin disease pathways in humans.

Current control is aimed at controlling fungal growth and AFB₁ formation in food by physical (Irradiation, autoclaving, cooking, roasting, pasteurization, dry heat and Aeration), chemical (Acids, bases and oxidants), biological (Yeast, lactic acid bacteria, enzymes and toxins) and biotechnological (Plant breeding, genetic engineering and microarray) methods. However, these methods require sophisticated equipment, expensive chemicals and can cause some serious drawbacks related to environmental issues, safety concerns, development of resistant races to pests and residual toxicities [1]; hence, there is a need for eco-friendly, biodegradable and safer alternatives to control biodeterioration and biodegradation of food items. In recent years, considerable attention has been directed toward natural compounds, such as essential oils (EOs). Many of them are generally recognized as safe (GRAS) by the United States Food and Drug Administration (FDA), appear as a promising approach for controlling AFB₁ production in food. Microencapsulation technology is recently prescribed to use the EOs as antimicrobials preservatives of agri-food commodities [2]. The main reason for promoting the application of natural products is the consumer's preference for natural methods to preserve foods. The aim of our mini-review is to summarize the results from the literature on the effects of EOs against *A. flavus* growth and AFB₁ production.

Keywords *Aspergillus flavus*; AFB₁; essential oils; food

References

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