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## Toxicological Assessment of *Aspergillus Flavus* Metabolites in Resistant Kenyan Maize Varieties

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### Abstract

Although aflatoxin contamination is of most concern, contamination by other secondary *A. flavus* metabolites is seldom considered in estimating the burden of exposure. Preliminary data on the metabolic profile of *A. flavus* revealed aflavinine and aflatrem as highly prevalent mycotoxins. Aflatrem is a mammalian tremorgen, and aflavinine has been shown to have anti-insectan properties, however knowledge on their impact on human and animal health is scarce to non-existent. These compounds could have their own intrinsic toxicity or could act synergistically with aflatoxins. The consumption of maize in developing countries is not likely to stop, so there is an urgent need to tackle perform more in-depth research on *A. flavus* toxic metabolites.

Preliminary toxicity studies suggest that aflavinine and aflatrem are potentially neurotoxins and could imply serious health issues such as mental confusion, tremors, seizures and consequent death. This study aims to identify the toxicological effects of aflatrem and aflavinine through the use of an *in vivo* zebra fish model. Toxicological assessment by the use of zebrafish is gaining popularity as they have a rapid embryonic development and a well understood genome. Behavioural, morphological, and more specifically hepatocellular endpoints can be targeted.

Aflavinine and aflatrem are occurring in non-aflatoxigenic strains of *A. flavus*. The use of non-aflatoxigenic strains of *A. flavus* as biocontrol agents against their aflatoxigenic counterparts are becoming commonplace. Large-scale studies over the years have led to the development of biocontrol agents for commercial application based on the ability of the non-aflatoxigenic strains to reduce aflatoxin contamination in cotton seed, peanuts and maize. These formulations are based on the fact that non-aflatoxigenic strains can outcompete aflatoxigenic strains, and because of a point-mutation in the polyketide synthase gene they do not have the capability to synthesize aflatoxins. However, this approach has potential pitfalls, which should be addressed and understood before wide adaptation. A limitation is that these biocontrol agents are being selected based on their inability to produce aflatoxins, however, others could have the ability to produce other secondary metabolites detrimental to humans and animals upon consumption.

**Keywords:** Aflatoxins, aflatrem, aspergiulls, Kenya