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A Study on Aflatoxins: Disease and Chemical Prevention

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Abstract

Aflatoxin constitutes a unique group of highly oxygenated coumarin derivative hetrocyclic compound produced by the toxigenic strains of *Aspergillus* sp.; especially *A. flavus* Link and *A. parasiticus.* In biological activities, the toxicity of aflatoxins varies according to the target host, doses and duration of exposure, LD_{50} is observed in various animals resulted serious problems including carcinoma. U.V. radiation treatment, acetic acid and ammonia etc. are used for prevention of mold growth.

Key Words: Mycotoxins, Aflatoxins, Biological activity, LD50, Chemical prevention

Introduction

Mycotoxins are produced by mold are toxic secondary metabolites, that can cause harmful effect in animals, humans and plant too. Aflatoxin constitutes a unique group of highly oxygenated coumarin derivative hetrocyclic compound produced by the toxigenic strains of *Aspergillus* sp.; especially *A. flavus* Link and *A. parasiticus*. They are acutly toxic secondary metabolites synthesised in the cytoplasm. Aflatoxin was initially believed to be a storage problem, but investigators determined that the fungus can invade cotton seed, corn, coconut, pea nut, beans, pulses almonds etc., and produce Aflatoxins before harvest, insect seems to be vectors for the fungus.

Methodology

In biological activities, the toxicity of aflatoxins varies according to the target host, doses and duration of exposure. Aflatoxins have been found to be lethal to animals evan at short term exposure, while long term exposures causes tumers in organnels (Wogen, 1966). It induces variety of symptoms, i.e., loss of appetite and reduction in growth of animals, liver, kidney, skin, intestine and genital organnels show necrosis and proliferation in tissues, development of carcenoma tumer and mutation in the cells are common features in affected animals .Biochemically aflatoxin also affect alter RNA& DNA metabolism, changes in protein synthesis in the affected animals (Smith, 1963). Aflatoxins are carsinogenic have been found to be lethal some times for human and a variety of laboratory animals including primates.

Table:- LD_{50} of aflatoxins for laboratory animals

SPECIES	LD_{50} (SINGLE DOSE) (mg/kg BODY WEIGHT)
DUCKING	0.3-0.6
PIG	0.6
DOG	1.0
GUINEA PIG	1.4-2.0
SHEEP	2.0
MONKEY	2.2
RAT	5.5-17.9
CHICKEN	6.3
MOUSE	9.0

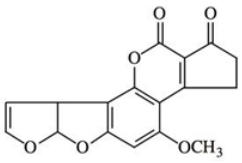
Table :- Data taken from fungi pathogenic for humans and animals: Edited Howard, 1983 Marcel Dekker Inc. New York

Chemicals used for prevention

Various chemicals for prevention of mold growth on grains have been proposed and a limited number of substances are in use commercially. Physical sorting of cooling is practical, primarily in the pea nut industry. U.V. radiation treatment is also effective, in some cases, various chemicals for prevention of mold growth on grain have been proposed and a limited number of substances are in use commercially; these compounds eg. acetic acid and prop-ionic acids and ammonia (Bothast et al., 1975). Dilution of contaminated commodity with non-contaminated product to a safe toxin level, chemicals detoxification appears to be the approach currently receiving most research attention. In India hydrogen peroxide has been used commercially for detoxifying pea nut protection for human food (Sreenivasa et al., 1971). However, ammonisation for detoxification of oil seed meals and of corn, seem to be the most promising approach somehow. Another effective approach to minimize the mycotoxises to maintain hygiene personally as well as commodity wise is to restrict the bad effect of mycotoxins.

Results and Conclusions

Studies & reports are carried out to define mycotoxicoses, causes, determination & prevention, resulted very serious problem of food toxicity for animals as well as human beings worldwide. The best way to control the presence of mycotoxins, is to prevent their production correct application of food & feed technology necessary to prevent proliferation of potentially hazardous fungi should be achieved, including maintenance of product quality during growth harvesting, transportation processing and storage of organic raw materials, probably the most important factors for controlling the presence of mycotoxins in the initial raw materials to be used in certain biotechnological processes, are the prevention of damage to crop during harvest and rapid post-harvest reduction of moisture to levels below those required for fungal growth. In biotechnological processes using fungi, the culture purity must always be of paramount importance. Notwithstanding, all products from fungal processes should be routinely screened for any possible mycotoxin presence. The costs for such testing is small compared with the possible consequences of human toxicology. WHO (1979) have set out a list of recommendation for further study to improve the understanding of human implications of mycotoxin, Exposure must be minimised, and hygienic atmosphere also mentioned to avoid the risk of animals and human health caused by mycotoxins.



Aflatoxins

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