

# Aflatoxins

## Introduction

Aflatoxins are toxic metabolites produced predominantly by two species of mould, *Aspergillus flavus* and *Aspergillus parasiticus* which are widely distributed in the nature and form the toxins at temperatures ranging from 12 to 42°C and relative humidity larger than 80%. All aflatoxins are acutely and chronically toxic. Aflatoxin B<sub>1</sub> is considered to be one of the most potent hepatotoxins and is also a human carcinogen. It is linked with the development of human hepatocellular carcinoma. It is regarded as a human carcinogen by the International Agency for Research on Cancer. Toxicity for aflatoxins occurs at very low levels and aflatoxin B<sub>1</sub>, for example, at concentrations of parts per billion can cause very damaging effects.

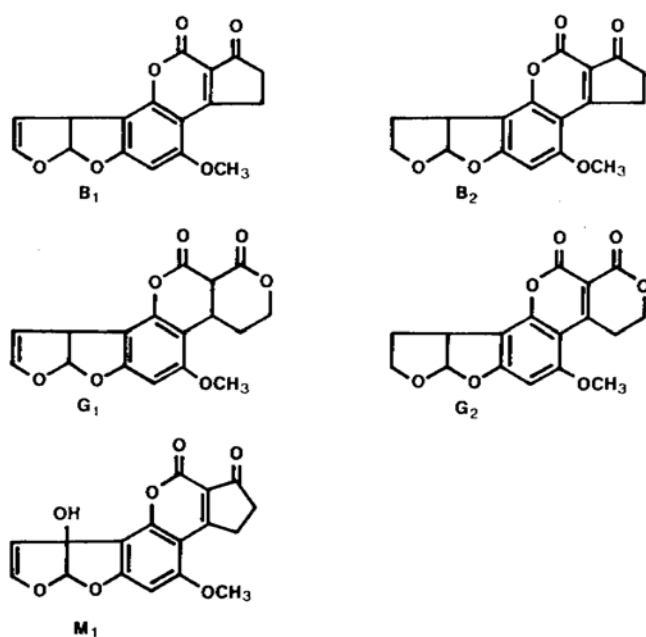


Fig 1: Structure of Aflatoxin B<sub>1</sub> and related aflatoxins.

## Aflatoxins and Human Health

Humans are exposed to aflatoxins by consuming foods contaminated with products of fungal growth. Such exposure is difficult to avoid because fungal growth in foods is not easy to prevent. Even though heavily contaminated food supplies are not permitted in the market place in developed countries, concern still remains for the possible adverse effects resulting from long-term exposure to low levels of aflatoxins in the food supply.

Evidence of acute aflatoxicosis in humans has been reported from many parts of the world, namely the Third World Countries, like Taiwan, Ouganda, India, and many others. The syndrome is characterized by vomiting, abdominal pain, pulmonary edema, convulsions, coma, and death with cerebral edema and fatty involvement of the liver, kidneys, and heart. Conditions increasing the likelihood of acute aflatoxicosis in humans include limited

availability of food, environmental conditions that favor fungal development in crops and commodities, and lack of regulatory systems for aflatoxin monitoring and control. Because aflatoxins, especially aflatoxin B1, are potent carcinogens in some animals, there is interest in the effects of long-term exposure to low levels of these important mycotoxins on humans. In 1988, the IARC placed aflatoxin B1 on the list of human carcinogens. This is supported by a number of epidemiological studies done in Asia and Africa that have demonstrated a positive association between dietary aflatoxins and Liver Cell Cancer (LCC). Additionally, the expression of aflatoxin-related diseases in humans may be influenced by factors such as age, sex, nutritional status, and/or concurrent exposure to other causative agents such as viral hepatitis (HBV) or parasite infestation.

#### Determination

Thin layer chromatography (TLC), also known as flat bed chromatography or planar chromatography is one of the most widely used separation techniques in aflatoxin analysis. The TLC method is also used to verify findings by newer, more rapid techniques. In our study we used two dimension technique proposed by Ministry of Health of Russia, 1992. Methodical recommendation for detection of Aflatoxin in the foodstuff, MH USSR 10.12 80, N2273 – 80.

#### Results for the 18 Samples

No	Date	Source	Foodstuff	Aflatoxin B1 Limit of detection 15 ppb
1.	11.02.02	AV Food processing	Peanut	BDL
2.	21.02.02	AV Food processing	Peanut	BDL
3.	11.03.02	AV Food processing	Peanut	BDL
4.	22.03.02	AV Food processing	Peanut	BDL
5.	15.05.02	AV Food processing	Peanut	BDL
6.	7.06.02	AV Food processing	Peanut	BDL
7.	9.08.02	AV Food processing	Peanut	BDL
8.	20.08.02	AV Food processing	Peanut	BDL
9.	27.08.02	AV Food processing	Peanut	BDL
10.	21.10.02	AV Food processing	Peanut	BDL
11.	8.11.02	AV Food processing	Peanut	BDL
12.	13.11.02	AV Food processing	Peanut	2000 pbb
13.	14.11.02	AV Food processing	Peanut	BDL
14.	26.11.02	AV Food processing	Peanut	1400 pbb
15.	12.12.02	AV Food processing	Peanut	BDL
16.	17.12.02	Windarra farm	Peanut	1000 pbb
17.	21.01.03	AV Food processing	Peanut	BDL
18.	10.02.03	AV Food processing	Peanut	BDL

17 samples were analyzed for Auroville Food Processing unit – one of the main supplier for the different peanuts products for the Pour Tous shopping complex. All 17 samples were delivered to lab from the bulk market of peanut (*Arachis hypogea*) from Pondicherry. After analysis 3 samples were rejected due to high Aflatoxin B1 level of contamination.

One samples was analyzed from the local farm. It was highly contaminated with Aflatoxin B1.

Conclusion:

1. All source of the Peanut for the AV Food Processing unit must be regularly monitored for the present of Aflatoxin B1.
2. All the AV Peanut growing farms must test the product before processing.
3. Laboratory should extend detection for the Aflatoxins for B2, G1, G2 for the peanut and M1 for the milk and cheese analyzing.