
Mycotoxins in Crops: A Threat to Human and Domestic Animal Health

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ABSTRACT

As we know Mycotoxins are chemicals produced by micro fungi that are harmful to humans and domestic animals. These chemicals may contaminate staple food and feeds world-wide posing a number of significant food safety concerns. Mycotoxin may be fatal or cause severe illness at very small concentration often measured in parts per million(ppm) or parts per billion(ppb). There may be thousands of mycotoxins on the planet earth, but only a small fraction of these toxic chemicals has the potential to cause plant and animal diseases. In nature mycotoxins may act to disable host defence responses or to defend the fungus against other micro-organisms.

Monitoring or surveillance of mycotoxin level in crops and products is an important management tactic and it can be implemented pre-harvest and post-harvest.

Key words: Mycotoxins, Secondary metabolites, Fungal secondary metabolic.

Introduction:

Mycotoxins are toxic metabolites produced by fungi, especially by saprophytic moulds growing on foodstuffs or animal feeds. They must always have been a hazard to man and domestic animals, but until the past 30 years their effects have been largely overlooked. Although poisonous mushrooms are carefully avoided, moulds growing on foods have generally been considered to cause unaesthetic spoilage, without being dangerous to health. Between 1960 and 1970 it was established that some fungal metabolites, now called mycotoxins, were responsible for animal disease and death. In the decade following 1970 it became clear that mycotoxins have been the cause of human illness and death as well and are still causing it.

Major groups of mycotoxins:

Major groups of mycotoxins are – Aflatoxins, Ochratoxins, Citrinin, Ergot Alkaloids, Patulin, Fumonisin, Trichothecenes, Zeralenone, Beauvericin, Enniatins, butenolide, equisetin and Fusarins.

Major diseases in humans and domestic animals caused by mycotoxins:

Adverse human health effects from the consumption of mycotoxins have occurred for many centuries. As the mycotoxin contamination levels generally found in food products traded in market economies, adverse human health effects have largely been overcome.

The diseases caused by exposure to mycotoxins are known as mycotoxicosis. Mycotoxins have various acute and chronic effects on human and animals.

Aflatoxin-B1 the toxin on which major resources have been expended has long been linked to liver cancer, yet its other effects, such as immune suppression and growth faltering previously observed in veterinary studies, are only now being investigated and characterised in human populations. Exposure to mycotoxins is a serious risk to human health, especially in developing countries where the effects of poverty and malnutrition lead to an exacerbation of

detrimental effects of these food-borne toxins by circumscribing bio-chemical detoxification mechanism. Even when the health risks of mouldy grain to human health are recognised. The contaminated grain be fed to livestock, decreasing animal productivity and food supply, and increasing poverty.

Aflatoxin-B1 causes enlarged liver, kidney damage and lesions of bile duct hyperplasia in horses, hepatitis in dogs, pulmonary tumour formation in rats and mice. In ruminants such as cattle, sheep, goats and deer production (milk, beef or wool), reproduction and growth can be altered when ruminants consume mycotoxin contaminated feed for extended periods of time (Hussein and Brasel 2001).

Three mechanisms whereby mycotoxins affect animals are (I) impaired nutrient absorption and metabolism (II) involves endocrine and neuroendocrine disorders (III) most dangerously leads to the suppression of immune systems. Exposure to mycotoxins is mostly by ingestion, but can also occur by the dermal and inhalation routes.

Mycotoxin in food and feeds:

Mycotoxins in humans or animals are characterised as food or feed related, non-contagious, non-transferable, non-infectious and non-traceable to micro-organisms other than fungi. Contaminated with mycotoxins both pre and post-harvest (AFTs 2003) Aflatoxins (AFTs) are found in dried fruits significant levels of coffee, spices and dried fruits. Other products of concern are beer, bread and bakery products, wine and grape juices, spices, poultry meat and kidneys, pig kidneys and pork sausages [Milicevic et al 2008].

Conclusion:

Cultural practices can be adjusted to reduce survival or spread of mycotoxin producing fungi in the field, or to avoid mycotoxin contamination of the crop through timing of planting and harvest. Because most mycotoxin producing fungi survive in crop residue, some reductions in contamination can be achieved through crop rotations, tillage or other sanitation practices. The success of this strategy is limited. However due to the ability of these fungi to spread by air borne spores over fairly long distances. Cultural practices such as plant spacing, weed control and irrigation can be altered to promote favourable to infection, by discouraging fungal development or reducing plant susceptibility.

For some crops, infection can be reduced through the use of fungicides, insecticides or biological control agents. Gauging the need for fungicides and optimizing the timing of applications has been greatly improved through the development of risk-assessment models, which are available on-line for wheat growing areas.

Post-harvest strategies for managing mycotoxins fall into the following categories -

- 1) Drying and storage management.
- 2) Sorting or other physical separation.
- 3) Detoxification

To minimize the health risk from mycotoxins, people are advised to –

- 1) Avoid damage of grains before and during drying, and in storage, as damaged-grains is more prone to invasion of moulds and therefore mycotoxin contamination.
- 2) Buy grains and nuts as fresh as possible.



- 3) Make sure that foods are stored properly i.e. kept free of insects, kept dry and not too warm.
- 4) To not keep food for extended periods of time before being used.
- 5) Ensure a diverse diet. This not only helps to reduce mycotoxins exposure, but also improves nutrition.

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