MYCOTOXINS

UK FIRM BIOSUPPLY IS HELPING TO TACKLE THE SCOURGE OF FLOUR PRODUCERS

by Biosupply, United Kingdom

Mycotoxins can be described as a family of poisonous secondary metabolites which can be generated from specific moulds. In general, they are able to grow on many different natural materials which can include foodstuff and crops, for example apple juice, dried fruit, coffee, nuts, cereals and many spices. Under suitable moisture and temperature conditions, fungi are able to rapidly proliferate to generate a large number of mycotoxins.

At present, there are more than 500 different mycotoxins which have been discovered and there is a gradual increase in this number as each year passes by.

Listed below are some of the most common types of mycotoxins:

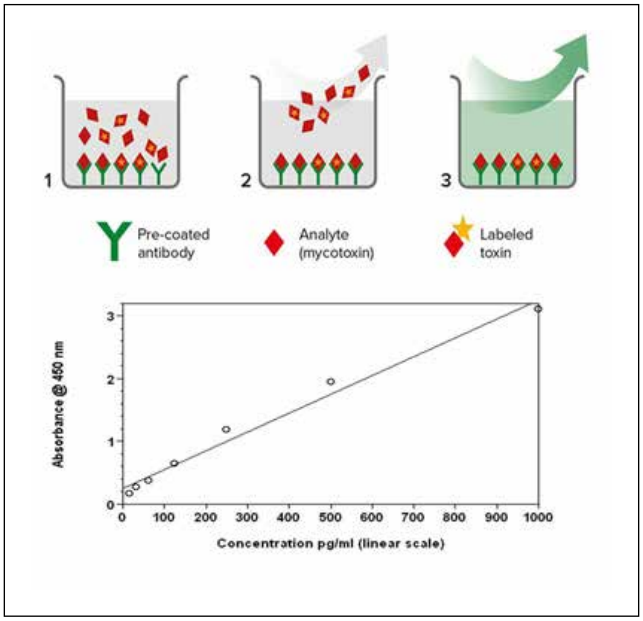
Aflatoxins: These belong to a family of mycotoxins which are produced by different strains of *Aspergillus*. There are many foodstuffs where these moulds can be found to grow, some of the most common including cereals, oilseeds, corn, cotton seeds, peanuts, spices, unrefined vegetable oils, cocoa, coffee and dried fruits. Sixteen different types of aflatoxins have been discovered and the most common types are aflatoxin B1, B2, G1, G2, M1 and M2

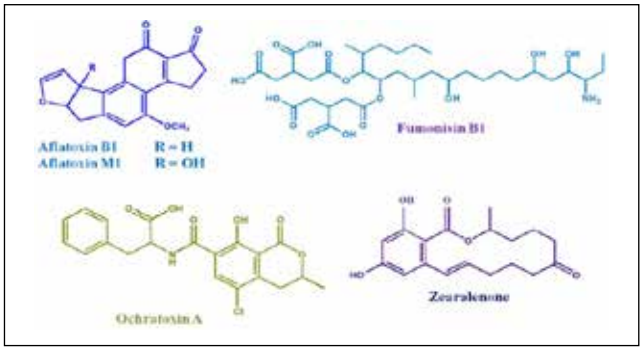
Fumonisins: These moulds are predominately discovered as contaminants in countries that have a temperate climate. Corn is an example of one of the most frequent contaminated products. There is also evidence to indicate that this mould may also be present in malt brewing and grains. Fumonisin B1 and B2 are typical examples

Trichothecene: These are members of the sesquiterpene family of compounds and there are 150 chemically-related mycotoxins which are present in this group. These mycotoxins are produced from *Stachybotrys* and they have been found in many different types of grains such as oats, wheat and maize. Satratoxin-H, T-2 mycotoxin and vomitoxin are common examples

Ochratoxin: These are mycotoxins which are often produced from specific types of fungi, in particular *aspergillus ochraceus* or *penicillium verrucosum*. Naturally, they can be present in a number of different plants such as cocoa, beans, coffee, nuts and cereals. Ochatratoxin A, B and C are some of the common typical example of these mycotoxins.

Zearalenone: These are estrogenic metabolites which are formed from *Gibberella* and *Fusarium* species. It has a property of being heat stable and can be present throughout the world in many different cereal crops such as wheat, oats,





rice, sorghum and maize. Typical example of toxic substances produced by *Fusarium* species include zearalenone, HT-2 toxin, deoxynivalenol and diacetoxyscirpenol.

ELISA procedure for screening mycotoxins

The enzyme linked immuno-sorbent assay (ELISA) procedure has been used for over a decade in order to either screen or detect specific mycotoxins. One of the main advantages of this method is to provide a rapid means of analysis in order to eliminate negative samples and, therefore, reduce the overall analysis number.

This technique relies on the ability of specific antibodies, which are able to distinguish the three-dimensional structure of certain mycotoxins.

At present, the majority of commercially available ELISA kits that can be used for detecting mycotoxins are working in the kinetic phase of antibody-antigen binding; this has the added advantage of reducing the incubation times into minutes rather than hours.

General steps involved in an ELISA test

1. Extract mycotoxins from a ground sample with solvent
2. Mix sample extracts with an enzyme-coupled mycotoxins
3. Add this mix solution to an antibody-coated microtiter well
4. Mycotoxins in the sample extract, or control standards, are allowed to compete against the enzyme-conjugated mycotoxin for antibody binding sites on the microtiter wells that are not already occupied (See step one in figure one)
5. A wash step is then carried out (See step two in figure one), followed by the addition of an enzyme substrate. This will result in producing a coloured solution (See step three in figure one). The intensity of the colour is inversely proportional to the amount of sample mycotoxin or standard that is present
6. Finally, a solution is then added in order to stop the enzyme reaction
7. An ELISA reader is used to measure the intensity of the colour at an absorbance filter of 450nm
8. The reading obtained for the samples can be compared to the reading obtained for the standards used. A standard curve (See figure one graph) is drawn and an interpretative result for the sample readings is obtained

ELISA kit methods are widely accepted as the favoured options for high throughput analysis, since this procedure requires low sample volumes and the potential of less sample extract clean up, when compared to other conventional methods such as HPLC and TLC.

Mycotoxins can be classified as secondary metabolism products from moulds and the subsequent uptake of mycotoxins through mouldy foodstuffs. These are responsible for causing mycotoxicosis, where even tiny concentrations are sufficient to cause a toxic effect. Some of these effects can be fatal by damaging the immune system, skin, liver and kidneys. ELISA kit procedures are the favoured choice for detecting mycotoxins, since they are simple, specific, sensitive, rapid and can be portable to be used outdoors in the field.

BioSupply offer a wide range of ELISA kits which can be used for food analytics and safety analysis, some of the more popular ELISA kits which are used routinely to detect mycotoxins include: aflatoxin B1, aflatoxin M1, fumonisin, T2-toxin, deoxynivalenol and zearalenone.

www.elisakits.co.uk