



## Do you know that cannabis is susceptible to mycotoxins?

More than 40 years ago a paper was published in the scientific journal *Mycopathologia* which discussed that under favourable conditions, *Aspergillus flavus* and *Aspergillus parasiticus* could flourish and produce aflatoxins in cannabis.

Aflatoxin (total)				
Moulds	<i>Aspergillus</i> spp.			
Favoured conditions	Warm and humid, field mycotoxin			
Toxin	AFT B1	AFT B2	AFT G1	AFT G2
Molecular formula	$C_{17}H_{12}O_6$	$C_{17}H_{14}O_6$	$C_{17}H_{12}O_7$	$C_{17}H_{14}O_7$
Molecular weight	312.3	314.3	328.3	330.3
Solubility	Insoluble in non-polar solvents Slightly soluble in water Freely soluble in moderately polar organic solvents (e.g. methanol, chloroform)			
Pathology	Carcinogenic (listed on IARC), affects liver, reproductive and endocrine systems			

Ochratoxin				
Moulds	<i>Aspergillus</i> spp., <i>Penicillium</i> spp. and <i>Monascus</i> spp.			
Favoured conditions	Warm and humid, field mycotoxin			
Molecular formula	$C_{20}H_{18}ClNO_6$			
Molecular weight	403.8			
Solubility	Moderately soluble in polar organic solvents (e.g. methanol, acetonitrile)			
Pathology	Carcinogenic, affects liver, kidney, digestive and immune systems			
Matrices	<ul style="list-style-type: none"> <li>• cereal</li> <li>• coffee</li> <li>• cocoa</li> </ul>	<ul style="list-style-type: none"> <li>• wine</li> <li>• spices</li> <li>• beer</li> </ul>	<ul style="list-style-type: none"> <li>• dried fruit</li> <li>• baby food</li> <li>• liquorice</li> </ul>	<ul style="list-style-type: none"> <li>• animal feed</li> <li>• herbs</li> <li>• offal</li> </ul>
Associated/modified mycotoxins	• Ochratoxin B (OTB)	• Ochratoxin C (OTC)	• Methyl-ochratoxin A	

Mycotoxins are secondary metabolites produced by the fungus organism, commonly known as mould. However, not all fungi can produce mycotoxins. Even those with the ability to produce mycotoxins may not produce them all of the time. Growth of the mycotoxin depends on temperature, pH, humidity and the presence of plant substrates.

Some mycotoxins, like aflatoxins are potent human carcinogens and as a result are legislated throughout the world. Strict maximum levels are in place for various foods. Legislation for mycotoxins is under consideration for cannabis and/or cannabis products where these products have been legalised. Therefore, these products now need to be scrutinised for residues and contaminants to the same extent as food or pharmaceutical products. This means applying the same safety standards for levels of mycotoxins that apply to foodstuffs and conducting routine monitoring to ensure standards are maintained for products placed on the market.

In terms of mycotoxin analysis, immunoaffinity columns are already well established for the clean-up of a diverse range of complex matrices for all the regulated mycotoxins, including aflatoxin. These products have been rigorously validated and have been applied to a variety of botanical products such as herbal medicines which have matrix similarities to cannabis.

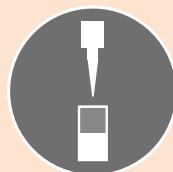
R-Biopharm are a global market leader and have been offering solutions for the mycotoxin industry for over 30 years with experience in developing test kits and applications for a wide variety of samples. All products are manufactured and tested under BS EN ISO 9001:2015 Quality Management Systems.

#### Available methods for analysis of mycotoxins in cannabis and cannabis products:



#### Immunoaffinity columns prior to HPLC or LC-MS/MS detection

- Contains antibody specific to the mycotoxins of interest
- Particularly suitable for complex and pigmented samples
- Single extraction can be utilised for multiple toxins
- Innovative methodologies that can improve and optimize workflow
- Cost effective and offering faster analysis



#### Automated immunoaffinity cartridges prior to HPLC or LC-MS/MS detection

- Used in conjunction with RIDA®CREST or RIDA®CREST ICE handling systems
- Automatic sample application and detection of mycotoxins
- Cartridges contain antibody specific to the toxin of interest
- Faster turnaround time leading to greater efficiency
- Improving accuracy whilst standardising methods

#### Additional services:

- Advice and on-site support available to help you find the best analysis option and application to suit the workflow and requirements of your laboratory
- Applications available for cannabis and cannabis products (i.e. capsules, oils, cookies, drinks etc.)
- Technical team offering training, method development and support when required