R-BIOPHARM RHÔNE LTD

It's rarely just one mycotoxin:

the benefits of multi-toxin analysis

- Accurately detect multi-toxins using harmonised methods
- Improve productivity and laboratory workflow
- Confidently analyse a wide range of matrices

More information:

https://r-b.io/food

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Multi-mycotoxin analysis

Co-occurance of mycotoxins

Mycotoxins produced by moulds are a major problem for global agriculture, with contaminations regularly causing crop losses. Cereals are particularly vulnerable; however, mycotoxins are also often found in spices, nuts, dried fruits, or coffee. There is a variety of different mycotoxins which may even occur simultaneously. For example, cereals may contain different types of trichothecenes (e.g. DON and T-2/ HT-2 toxin), while aflatoxin is often found together with ochratoxin in spices.

Mycotoxin legislation

Numerous mycotoxins are legislated by law, which means that the concentration in food and feed must not exceed a maximum level. It is therefore neccesary to test the products for all potentially present mycotoxins. Regulations for mycotoxins are complex, with different limits applied to specific commodities. If you consider the various matrices that are covered by EU legislation -

- For nuts, nut products and peanuts only aflatoxins are regulated, therfore there is no requirement for multi-mycotoxin method. Similarly, for milk and milk products only aflatoxin M1 is regulated so a method targeted at this single mycotoxin should be selected.
- For dried fruit and spices there are limits for aflatoxin and ochratoxin, in this case a multi-toxin method targeted at this combination is of interest.
- Cereals present a different situation where the *Fusarium* toxins (except fumonisins) are regulated in wheat-based cereals together with aflatoxins and ochratoxin. For maize the fumonisins are additionally regulated. In these instances, specific multi-mycotoxin immunoaffinity columns or solid phase extraction (SPE) columns can be employed.
- Baby foods and animal feed because they are composite in nature are regulated for all the mycotoxins so again a multi-mycotoxin approach can be recommended. Due to the low levels of sensitivity required for baby food multi-toxin immunoaffinity columns are preferred.

Peanuts, nuts and nut products

- Aflatoxin B1 and / or total

Dried fruit and spices

- Aflatoxin B1 and / or total
- Ochratoxin A

Cereals

- Aflatoxin B1 and / or total
- Deoxynivalenol
- Ochratoxin A
- T-2 & HT-2
- Zearalenone

Maize

- Aflatoxin B1 and / or total
- Deoxynivalenol
- Fumonisins
- Ochratoxin A
- T-2 & HT-2
- Zearalenone

Baby foods

- Aflatoxin B1 and / or total
- Aflatoxin M1
- Deoxynivalenol
- Fumonisins
- Ochratoxin A
- Zearalenone

Animal feed

- Aflatoxin B1 and / or total
- Deoxynivalenol
- Fumonisins
- Ochratoxin A
- T-2 & HT-2
- Zearalenone

Pasta

- Deoxynivalenol
- Zearalenone

Milk and milk products

- Aflatoxin M1

Simplistic overview of regulated mycotoxins for food and feed

Multi-toxin analysis

To perform efficient multi-mycotoxin analyses, many companies use liquid chromatography with mass spectrometric detection (LC-MS/MS). This sensitive method is particularly suitable for high sample throughput. However, the drawback of this method is that the result is strongly influenced by the matrix, leading to measurement uncertainty. When given appropriate tools, such as immunoaffinity columns, these so-called matrix effects can be reduced – even for multiple mycotoxins at the same time.

Immunoaffinity column clean-up produces clean extracts removing the requirement for matrix-matched or isotopic labelled standards as all interfering components have been removed. Ultimately analysis is faster and more cost effective with quantitative, accurate result being achieved first time round giving added confidence in results.

Requirements are changing as regulatory limits dictate for more combinations of mycotoxins to be analysed. R-Biopharm have a comprehensive portfolio of multi-toxin immunoaffinity columns to detect a range of mycotoxins with excellent accuracy and precision.

Multi-toxin immunoaffinity columns available		
Art. no.	Product	Format
P128 / P128B	11+Myco MS-PREP®	3 ml IAC
P89 / P89B	AFLAOCHRA PREP®	1 ml IAC
P115 / P115B	AOF MS-PREP®	3 ml IAC
P112 / P112B	AO ZON PREP®	3 ml IAC
P73 / P73B	DZT MS-PREP®	1 ml IAC
TC-MT3000	PuriTox Total Myco-MS	syringe SPE
TC-T220	PuriTox Trichothecene	syringe SPE

Flexibility of immunoaffinity columns

Multi-toxin immunoaffinity columns can not only be used prior to LC-MS/MS detection, there are many options available for those using HPLC detection –

- Aflatoxin and ochratoxin can easily be detected in a single HPLC run therefore AFLAOCHRA PREP® and AO ZON PREP® are ideal for those who wish to use fluorescene detection of these toxins.
- Alternatively, a single extraction method can be used and the sample extract split, and applied to numerous single toxin immunoaffinity columns either individually or connected in tandem.

The beauty of employing an immunoaffinity column clean-up is that irrespective of matrix, the method basically follows the same tried-and-tested steps. The extraction of the toxin/s from the matrix needs to be demonstrated, but otherwise the versatility of immunoaffinity column clean-up virtually ensures ease of analysis by either HPLC or LC-MS/MS without fear of any matrix interferences.

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Benefits of multi-toxin immunoaffinity columns

Multi-toxin immunoaffinity columns such as 11⁺Myco MS-PREP® are particularly suitable for the analysis of cereals, cereal products, baby food and animal feeds. These commodities can be difficult to analyse due to the complexity of the matrix or in the case of baby food due to the low limits of detection required. The columns therefore allow analysts to overcome these issues improving chromatography and sensitivity.

Multi-toxin immunoaffinity columns can reduce overall costs as there are savings in –

- Storage of columns
- Transportation of products
- Overall waste disposal costs
- Consumable costs such as solvents and disposables used
- Number of man hours taken to run analysis for numerous toxins

However, one of the biggest benefits when converting to multi-toxin analysis is that productivity within the laboratory can be improved. A single extraction can be performed for multiple mycotoxins which reduces the amount of time spent at the bench. In addition, the number of methods implemented within the laboratory can be reduced minimising time and cost of validations.

Benefits of multi-analyte testing

The heart of our established analytical methods is the immunoaffinity column however it should be recognised that not all commercially available columns perform as well as one another. R-Biopharm have been suppliers of immunoaffinity columns for mycotoxins for over 35 years and have an excellent track-record of supplying immunoaffinity columns for inter-laboratory method validation. We will continue to apply our expertise to extending the range of matrices and products required to make your analysis easy!

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