

Identification and quantification of unregulated masked mycotoxins in grains

Background

Fungal contamination is problematic in a wide range of food products. Fungal growth, leading to spoilage, is the main cause of product and affiliated economic losses. A range of filamentous fungi are able to contaminate crops in the field or during storage and produce a large number of secondary metabolites that are particularly toxic for humans and animals, known as mycotoxins. As part of their defence response to these xenobiotics, plants can modify the structure of mycotoxins by conjugation to sugars, organic acids or sulfates, thereby generating masked mycotoxins. After consumption of foods containing these toxins, digestive processes are likely to result in the parent highly toxic mycotoxin being released in humans and livestock. While a large number of mycotoxins are known and detectable in food products, limited information is available for masked mycotoxins. To date, EU regulations on the maximum quantities allowed in various foods are in place for a range of mycotoxins, while only a few masked mycotoxins are currently regulated. This is mainly due to the lack of information related to the different conjugation processes and the difficulties that they present with current validated analytical detection methods.

Objectives

This project, carried out in collaboration with Dr Martin Danaher (Teagasc), will evaluate the impact of toxins released during fungal contamination at a raw-material level in a range of Irish produced grains. This project will involve a wide range of analytical techniques including various chromatographic techniques, Mass Spectrometry and Nuclear Magnetic Resonance. Special emphasis will be placed on the development of advanced analytical methods (LC-MS/MS) for the quantification of masked mycotoxins in food products.

The main objectives of this project are to;

- (i) Extraction, isolation and structural elucidation of masked mycotoxins present in contaminated grains using a wide range of analytical techniques
- (ii) Development and validation of LC-MS/MS methods for masked mycotoxins in various food matrices
- (iii) Application of developed methods for the quantification of masked mycotoxins in grains

Applicants

Applications are invited from graduates holding a BSc Hons (minimal 2:1) in Analytical chemistry or related fields. Applicants should have knowledge/experience of chromatographic and mass spectrometric techniques. The successful candidate should be highly self-motivated and demonstrate excellent problem solving skills.

For further information please contact Dr Thomas Smyth at smyth.thomas@itsligo.ie