

Editorial

Mycotoxins in Beverages

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Mycotoxins are secondary metabolites produced by fungi that contaminate raw materials such as cereals, fruits, dried fruits, coffee, and grapes when they have been produced or maintained in a temperature and/or humidity conditions that favor fungi growth. In general, mycotoxins are very resistant to temperature and remain stable during food preparation and processing [1]. Therefore, food prepared from contaminated raw materials can retain the levels of these compounds. Several beverages are produced based on raw materials prone to be contaminated, such as beer from cereals, wine from grapes, coffee, and more. Moreover, and due to the fact that one fungal species can produce various of these metabolites [2], the most likely scenario is the co-occurrence of several mycotoxins in one food product.

Mycotoxins have different toxic effects on human health. They can be divided into acute effects, due to the ingestion of high levels of toxins in a short time period, and into chronic effects, due to the ingestion of low quantities for a long time. These chronic effects are the most common ones and they have been described as hepatotoxicity, immune diseases, carcinogenicity, genotoxicity, endocrine and reproductive effects, mutagenicity, teratogenicity, nausea, vomiting and diarrhea, among others [2]. All the above make the presence of these compounds in human foods a global problem regarding food safety and also regarding economics, due to the loss of lots of contaminated raw materials or food products and its impact on global trade [3].

In order to protect human health, legislative organisms promote the monitorization of these toxins in raw materials and foods, along with the regulation of maximum levels that can be present in some food products.

This Special Issue “Mycotoxins in Beverages” comprises three research articles and three reviews related to the presence of these toxins in beverages and covers different aspects. The research articles are devoted to the presence of mycotoxins in beer and milk. The reviews collect, on the one hand, information regarding mycotoxin presence in wine and in beverages obtained from tropical crops, and, on the other, new approaches for detecting ochratoxin A and other compounds in beverages.

The first research work in this issue, by Bertuzzi et al. (2018) [4] studies the occurrence of four mycotoxins (ochratoxin A, deoxynivalenol, sterigmatocystin and citrinin) in small- and large-scale brewed beer collected in Italy. Fortunately, and although some of these mycotoxins were detected, especially OTA, authors indicate that the levels found were low and without serious hazard for consumers.

The second and third papers study the presence of mycotoxins in milk. This beverage is very important in the human diet, especially in Europe, the Americas, India, and Australasia [5], and it is known that mycotoxins could reach it through the feeding of animals with contaminated feed. Rodriguez-Carrasco et al. (2018) [6] present a new and validated QuEChERS-UHPLC-Q-Orbitrap HRMS methodology suitable for studying the presence of AFB1 and AFM1 (its main metabolite) in milk at trace levels. In fact, the authors indicate that sensitivity and an easy and cheap sample preparation procedure are the main benefits of this analytical procedure. This methodology was applied to Italian milk samples and none of the mycotoxins were detected.

Flores-Flores and González-Peñas (2018) [7] study the presence of 22 mycotoxins (aflatoxins M1, B1, B2, G1, G2; ochratoxins A and B; fumonisins B1, B2 and B3; HT-2 and T-2 toxins; nivalenol; deoxynivalenol; deepoxy-deoxynivalenol; 3 and 15 acetyl-deoxynivalenol; diacetoxyscirpenol; fusarenon X; neosolaniol; sterigmatocystin; and zearalenone) in Peruvian cow milk samples. Peru has a great diversity of climates due to its tropical latitude and diverse topography. These characteristics promote the growth of a wide variety of fungi. Nevertheless, and fortunately, only ochratoxin A was detected and it was at low levels.

In regards to the reviews, Granados-Chinchilla et al. (2018) [8] study the analytical methodologies and the presence of mycotoxins in those beverages obtained from tropical crops (tea, mate, nut milk, fermented beverages, coffee, chocolate, fruit drinks), due to the fact that the climate conditions and the conditions for cultivation and processing make the raw materials in the part of the world where these are typically processed to be prone to fungal contamination. The authors require more scientific research in order to improve the knowledge regarding fungal contamination of tropical products, the validation of the methodologies that should be applied, the realization of surveillance programs and the implementation of local legislation.

Mavrikou and Kintzios (2018) [9] review new advances in biosensor technology for the determination of ochratoxin A and 2,4,6-trichloroanisole in beverages. Both compounds are fungi metabolites synthesized depending on the temperature and humidity conditions. The authors conclude that this technology could be an alternative to conventional analytical methods, with faster analyses, higher specificity and sensitivity, with the possibility of being automated. However, this has not yet been applied to actual samples and more research is needed to achieve its applicability.

Finally, the sixth published paper, from Gil-Serna et al. (2018) [10] reviewed the distribution of ochratoxin A and ochratoxigenic fungi in grape berries. Additionally, some factors that affect ochratoxin A presence on grapes, musts and wines are analysed. The authors conclude that ochratoxin A levels decrease during winemaking.

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