Fungal and mycotoxins contamination in non-alcoholic beverages - The case of tea from Portuguese market and coffee beans from Brazil

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Introduction

Agriculture constitutes one of the most sensitive sectors that **could be affected by the climate change**. Among the xenobiotics contaminating agricultural crops, **fungi** and **mycotoxins** are the most challenging since their presence represents an **economic burden** due to crops loss and a serious **health effects** related for **animal** and **human** with severe repercussions [1].

Objective

This study intends to characterize the **fungal** and **mycotoxins** contamination in tea available in Portuguese market and in coffee from two Brazilian industries.

Methods

Category	Origin	Packaging
Green tea	Lisbon markets	Bulk (n=13); Tea bags (N=27)
Black tea		
Herbal infusion		
Cofeea arabica	Industry A - Brasil	Coffe beans (n=10)
Cofeea arabica	Industry B- Brasil	Coffe beans (n=8)

1. Samples extraction

Tea leaves / Coffe beans → Extraction with 0.1% Tween™ 80 saline solution

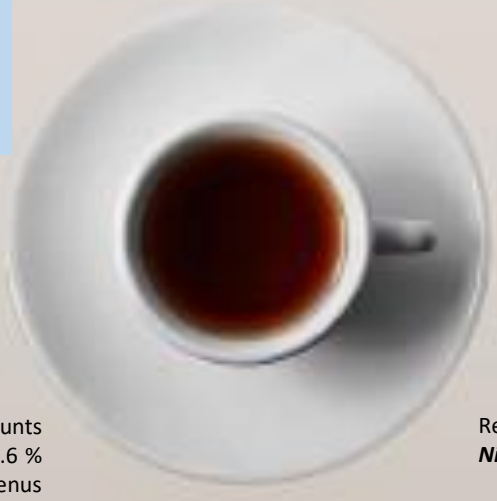
Tea Infusion → Boil in water + Filtration

2. Analysis

Culture – based methods
Fungal quantification and identification
Fungal resistant profile

Molecular tools
Aspergillus sections detection by qPRC
(*A.* section *Fumigati, -Nidulantes, -Circumdati and -Flavi)*

Metabolites assessment
Mycotoxins (n=38)



Results

1. Fungal contamination

Concerning tea samples, the **highest fungal** counts were obtained in **green raw tea** (87.7 % MEA; 69.6 % DG18). *Aspergillus* sp. was the **most prevalent** genus in all samples on MEA (54.3 %) and on DG18 (56.2 %).

Regarding coffee beans, ***Aspergillus* genera** was the one of the **most common observed** and sections with clinical relevance and with **toxigenic potential** (*Candidi, Circumdati* and *Nidulantes*) were recovered.

2. Azole resistance

Aspergillus* section *Fumigati isolate from green tea beverage recovered form itraconazole-Sabouraud dextrose agar (SDA) medium, **presented itraconazole and posaconazole** E-test MICs **above MIC90 values**.

3. Mycotoxins assessment

In the raw tea **23 of the samples (57.5 %)** presented **contamination by one to five mycotoxins in the same sample**, being the mycophenolic acid (MA) (the most prevalent), fumonisin B2 (FB2) (with higher concentrations) and sterigmatocystin the most reported.

In **coffee samples (n=18), four mycotoxins were detected**, namely **Aflatoxin B2 (AFB2), FB2, ochratoxin A and MA**. MA was the most prevalent with higher concentrations.

4. Molecular detection

Regarding coffee samples, **sections *Circumdati* and *Nidulantes*** were also detected by qPCR.

Conclusion

The results obtained in both beverages claim attention to food safety concerns

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The application of a One Health approach is required to address the contamination found.

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