Mycotoxin incidence in pre-harvest maize grains

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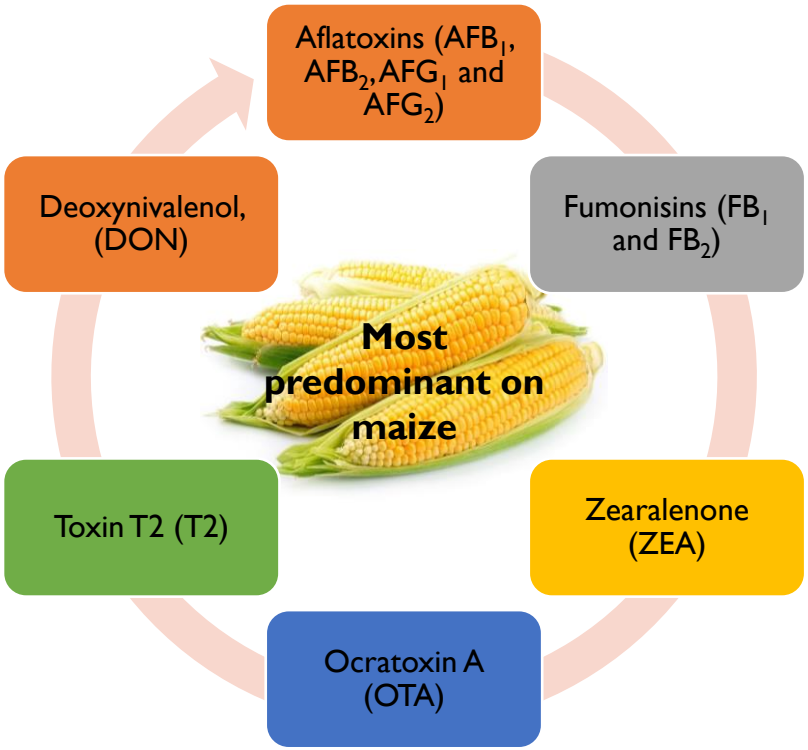
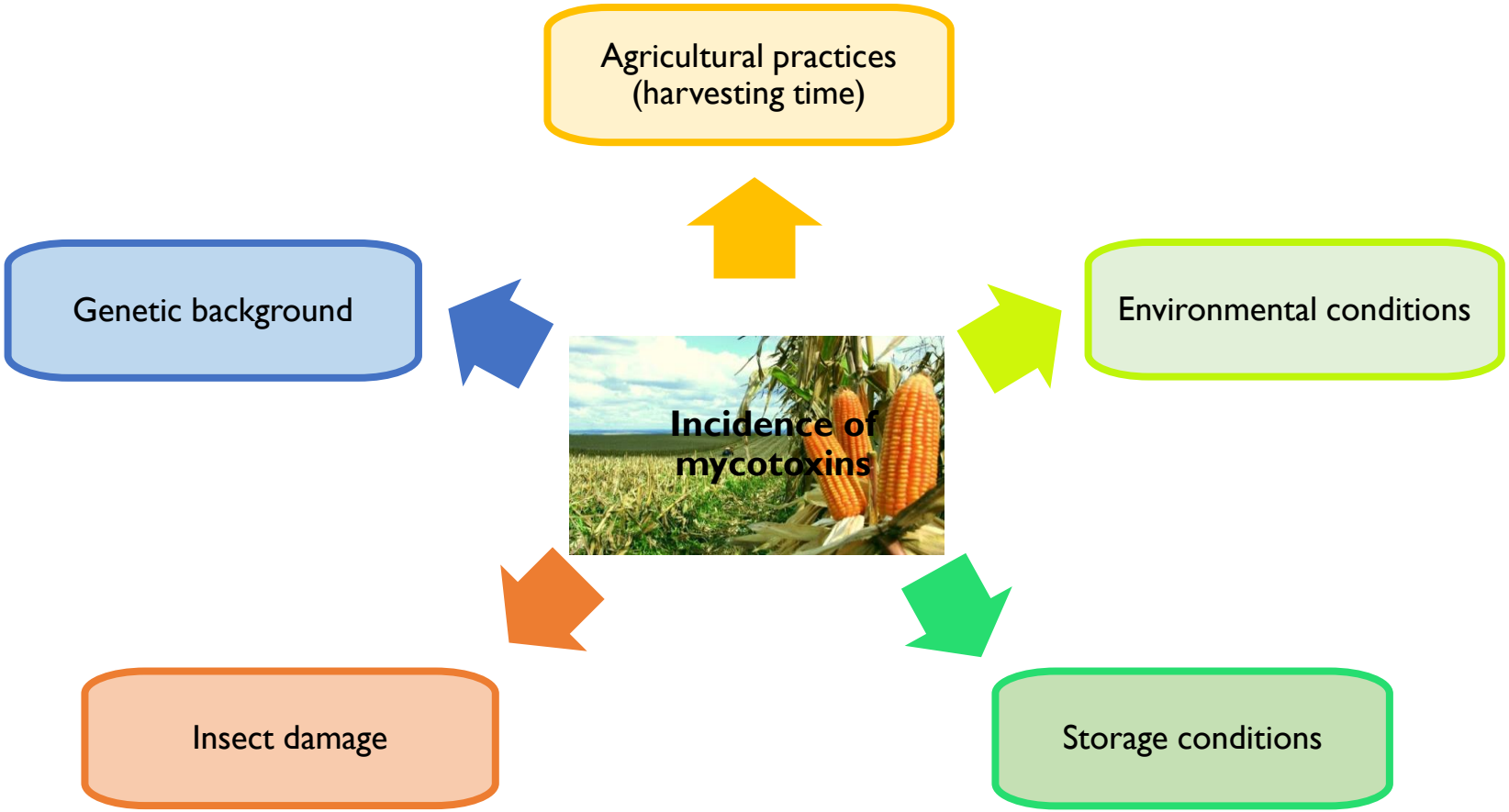
Introduction

The occurrence of mycotoxins in maize grain is a big concern due their potential risk for animal and human health, emphasized by the worldwide importance of maize as a commodity in feed and food uses.



Mycotoxins are secondary metabolites generated by toxigenic species of *Aspergillus*, *Penicillium* and *Fusarium* genus

Introduction



Objectives

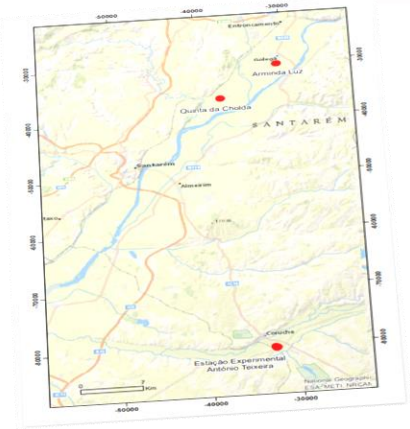
Evaluation, for the first time, the incidence of different types of mycotoxins on maize grains harvested on three farmers located at the Tagus Valley region of Portugal

Evaluation the impact of harvesting time on the mycotoxin contamination of maize.

Material and methods

Sampling

- 8 maize samples (A1, A2, A3, A4, B1, B2, B3 and C1), from 2019;
- Located at Tagus Valley region, Portugal;
- Three harvesting dates



Sample preparation

- Extracts (Acetonitrile 80%);
- Fumonisins: Extract diluted with ultra-pure water;
- Other mycotxins: extract evaporated and the residue redissolved with acetonitrile 40%

Determination of mycotoxin

- Performed by UHPLC-ToF-MS, with the chromatographic conditions as described by Silva et al., 2019.

Silva, A.S.; Brites, C.; Pouca, A.V.; Barbosa, J.; Freitas, A. UHPLC-ToF-MS method for determination of multi-mycotoxins in maize: Development and validation. *Curr. Res. Food Sci.* **2019**, *1*, 1–7, doi:10.1016/j.crfs.2019.07.001.

Occurrence of mycotoxins on maize

Samples	Harvested data	FB_1	FB_2
A1	1st	261.5 ± 78.2ab	167.1 ± 34.8bc
	2nd	347 ± 25.9ab	182.1 ± 20.3bc
	3rd	216.1 ± 47.7ab	109.3 ± 2.5a
A2	1st	240.4 ± 46.8ab	163.5 ± 21.8b
	2nd	nd	nd
	3rd	189.4 ± 23.8ab	114.7 ± 2.0a
A3	1st	133.3 ± 11.1a	126.4 ± 26.3a
	2nd	nd	nd
	3rd	117.7 ± 0.0a	108.9 ± 0.0a
A4	1st	149.9 ± 26.6a	114.5 ± 5.7a
	2nd	350.4 ± 36.7abc	174.7 ± 8.5bc
	3rd	727.3 ± 76.8abc	214.3 ± 6.2bc

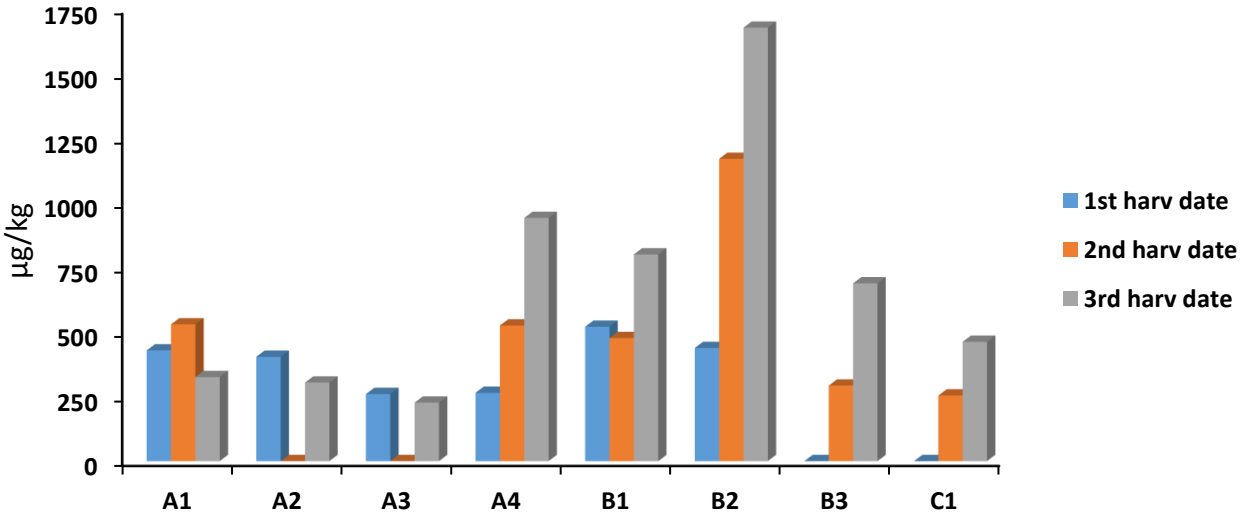
- In all the maize samples were detected only the fumonisins (FB_1 and FB_2)
- AFB_1, AFB_2, AFG_1, AFG_2, OTA, DON and ZEA were not found in maize samples in any harvesting time.

- FB_1 was the most predominant in all the samples;
- B2 showed the highest concentration of FB_1 (1182.4 ± 233.4 µg/kg) and FB_2 (495.7 ± 47.4 µg/kg) on the later harvesting;
- A3 exhibited the lowest concentrations of FB_1 and FB_2

Samples	Harvested data	FB_1	FB_2
B1	1st	339.4 ± 19.1abc	180.7 ± 8.5bc
	2nd	335.2 ± 99.9ab	141.2 ± 17.9a
	3rd	568.8 ± 216.9abc	231.5 ± 58.1bc
B2	1st	273.3 ± 97.6ab	164.7 ± 42.7bc
	2nd	844.1 ± 67.9c	326.2 ± 75.7c
	3rd	1182.4 ± 233.4abc	495.7 ± 47.4d
B3	1st	nd	nd
	2nd	169.0 ± 44.2ab	123.5 ± 12.7a
	3rd	480.8 ± 127.3abc	207.6 ± 29.7bc
C1	1st	nd	nd
	2nd	136.3 ± 4.6a	117.8 ± 5.8a
	3rd	303.2 ± 36.0ab	158.7 ± 8.9a

Results and discussion

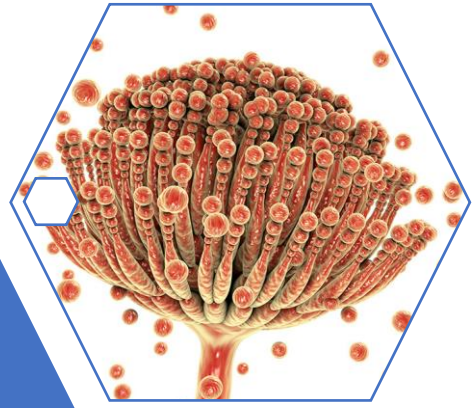
Influence of harvesting dates on the total fumonisins in maize



- Risk of contamination by FB_1 and FB_2 increases with late harvestings.

- ↓ total of fumonisins (FB_1+FB_2) on farmer A, not detected at 2nd harv date in A2 and A3, but without significant differences between de first and the final harvesting dates
- ↑ total of fumonisins on B and C farmers, in the later harvested dates.

Conclusions



Fumonisins are the main mycotoxins on the maize from Tagus Valley region, Portugal

Earlier harvestings are recommended, taking in account the full maturation and dry matter of maize grain

Further research is proposed including more data from other regions of Portugal, and other harvested years

Thank you for your attention

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