

Comparison and perspective among analytical methods

for determination of ochratoxin A (OTA) in cocoa



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Introduction - Ochratoxin A (OTA) is a mycotoxin formed by certain species of *Aspergillus* and *Penicillium*. The International Agency for Research on Cancer (IARC) has classified OTA as possibly carcinogenic to humans. Contamination by OTAs was found at all stage **Recommended serving sizes** of cocoa processing in the farm (Copetti et al., 2014), with the major incidence during post-harvest stages: drying and storage. The EU is deciding the limits of 0.5-2 ppb for OTA in cocoa products and cocoa.

Material and Methods – In this study, an Immunoaffinity column clean-up and HPLC method (Visconti et al., 1999) and an ImmunoSorbent Assay kit (*Techna*) were used to measure OTA levels in spiked cocoa bean samples and compared with those measured by label free Impedimetric Immunosensors.

References

1) Copetti et al. Review - Fungi and mycotoxins in cocoa: From farm to chocolate. *Int. J. of Food Microb.* 178 (2014) 13–20.

2) Visconti et al. Determination of ochratoxin A in wine by means of immunoaffinity column clean-up and high-performance liquid chromatography". *J. Chrom A.* 864 (1999) 89-10.

Ochratoxin (OTA) in Cocoa beans

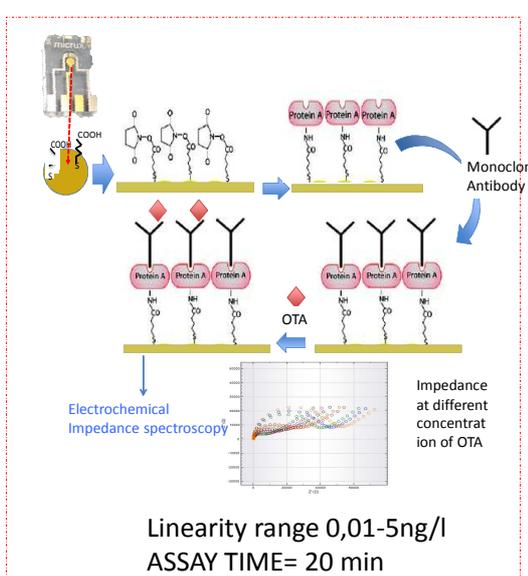
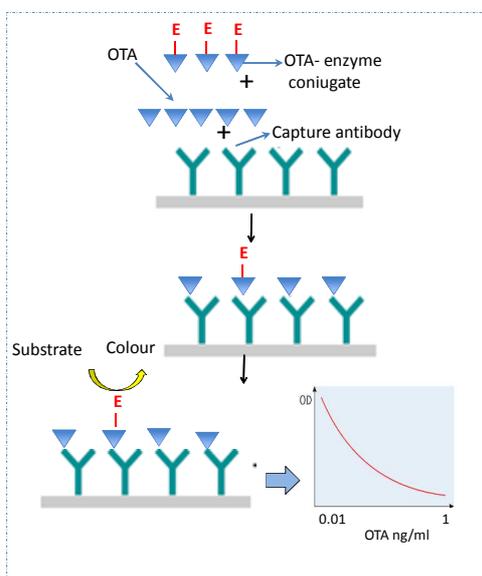
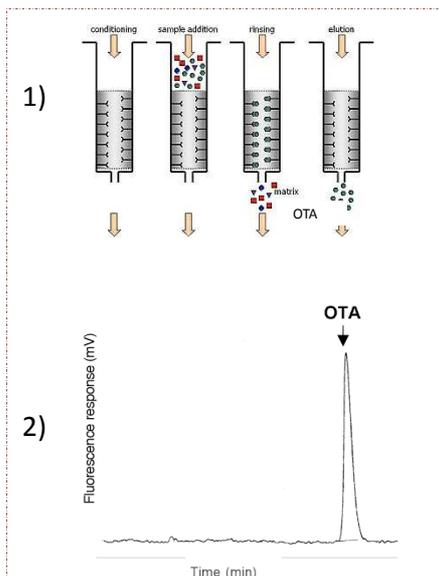


MLs for OTA in cocoa = 0.5-2 µg/kg

Immunoaffinity column clean-up and HPLC

Competitive ELISA

Impedimetric Immunosensor



Comparison among methods analysis on cocoa beans at different OTA solution spiking level.

Method of analysis	Cocoa bean spiking level	Recovery (% ± S.D.)	LOQ* (µg/kg)
HPLC	1 µg/kg	85.24 ± 0.13	0.033
	2 µg/kg	83.31 ± 0.25	
	4 µg/kg	100.00 ± 0.11	
ELISA	1 µg/kg	83.17 ± 2.08	1
	2.5 µg/kg	94.25 ± 1.77	
Impedimetric immunosensor	1 µg/kg	95.33 ± 5.00	0.2
	2.5 µg/kg	94.00 ± 4.04	
	5 µg/kg	93.12 ± 6.25	

* LOQ = Limit of quantification

Conclusion - The Impedimetric Immunosensors used for the OTA analyses have shown a good recovery percentage and a low LOQ. Moreover, they offer the advantages over traditional methods of being simple, rapid and portable devices.