

# Extraction and detection of mycotoxins in medicinal and aromatic plants: A case study with *Aloysia citrodora* P.



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## Introduction

Plants frequently suffer contaminations by toxigenic fungi, and their mycotoxins can be produced throughout growth, harvest, drying and storage periods. The objective of this work was to validate a method for detection of toxins in medicinal and aromatic plants, through a fast and highly sensitive method, optimizing the joint co-extraction of aflatoxins (AF: AFB<sub>1</sub>, AFB<sub>2</sub>, AFG<sub>1</sub> and AFG<sub>2</sub>) and ochratoxin A (OTA) by using *Aloysia citrodora* P. as a case study.

## Sample



## Methods and Results

### Spiking of samples

Sample +  
Mix of the four AFs and OTA at 10 ng/g for AFB<sub>1</sub>, AFG<sub>1</sub> and OTA, and at 3 ng/g of AFB<sub>2</sub> and AFG<sub>2</sub>

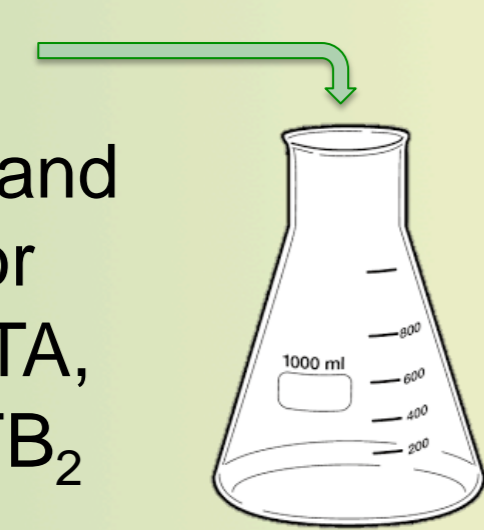
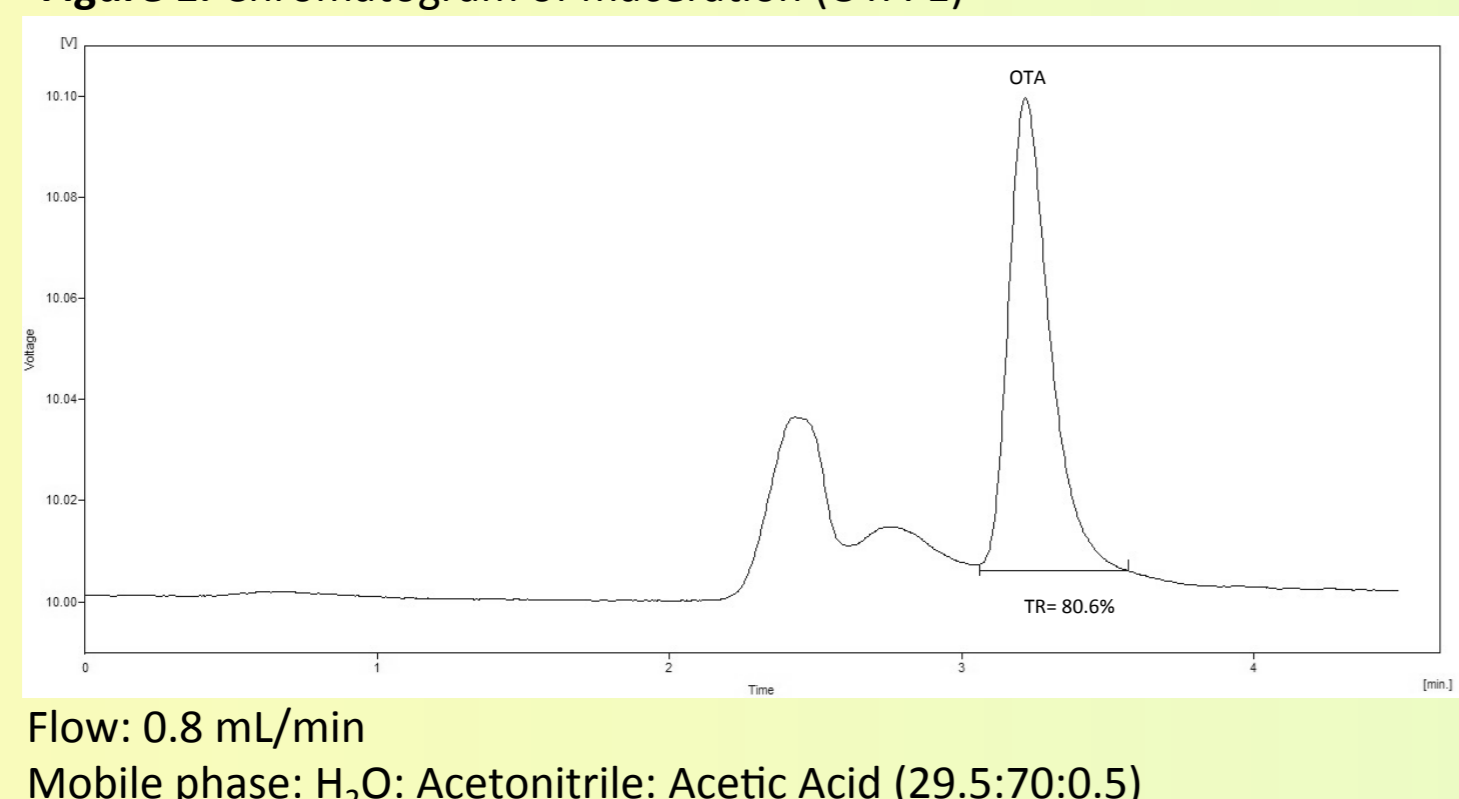
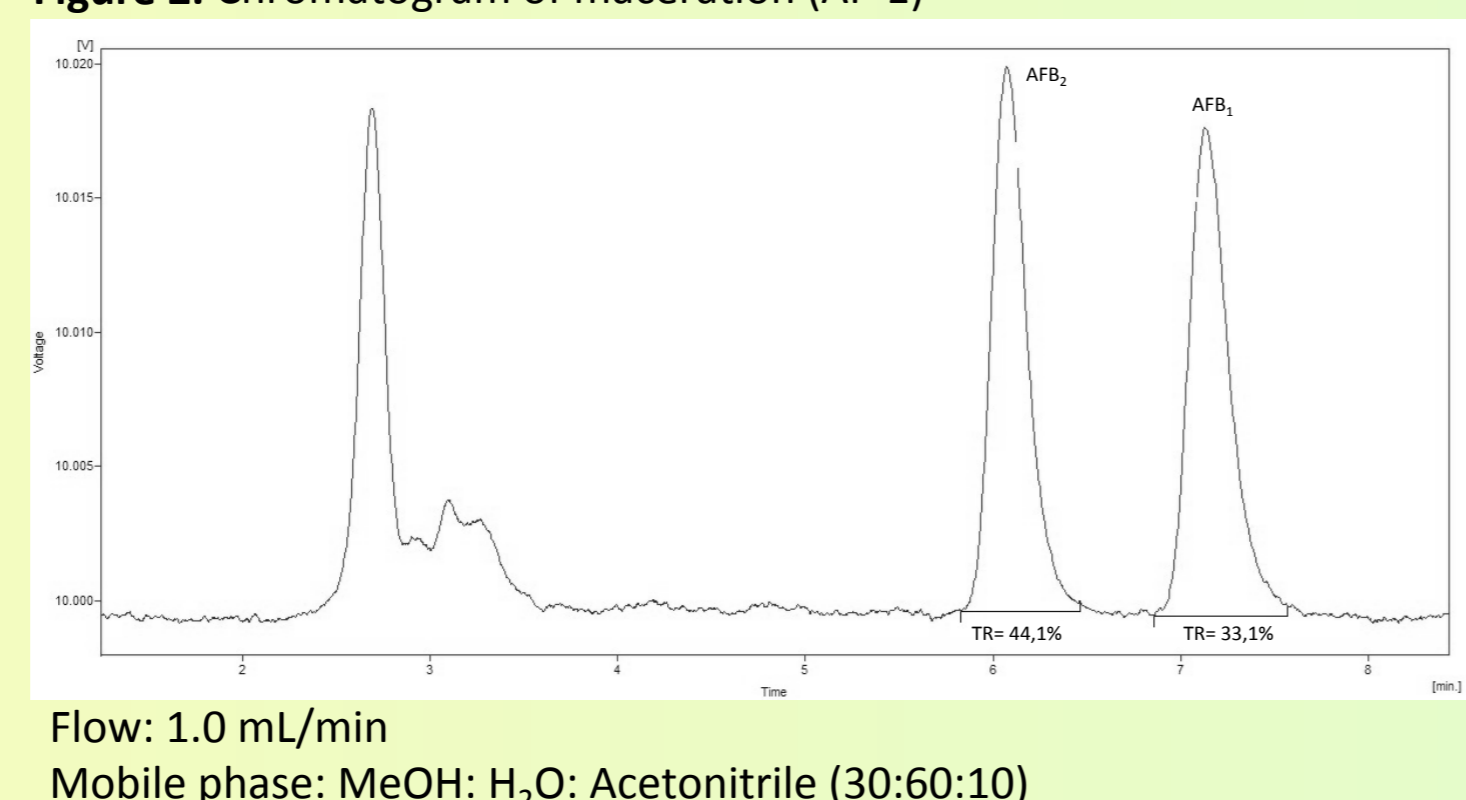


Figure 1. Chromatogram of maceration (OTA-1)



Flow: 0.8 mL/min  
Mobile phase: H<sub>2</sub>O: Acetonitrile: Acetic Acid (29.5:70:0.5)

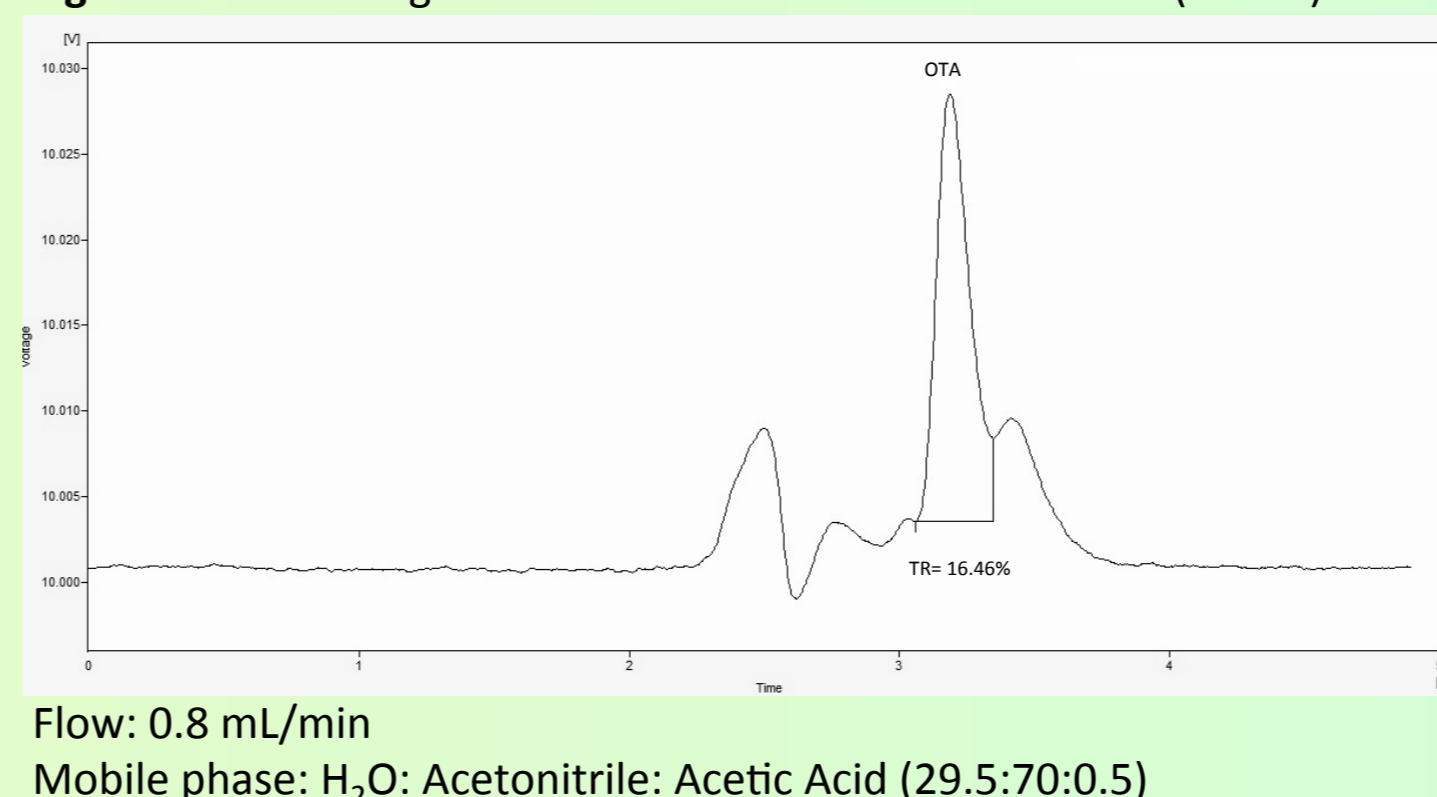
Figure 2. Chromatogram of maceration (AF-1)



Flow: 1.0 mL/min  
Mobile phase: MeOH: H<sub>2</sub>O: Acetonitrile (30:60:10)

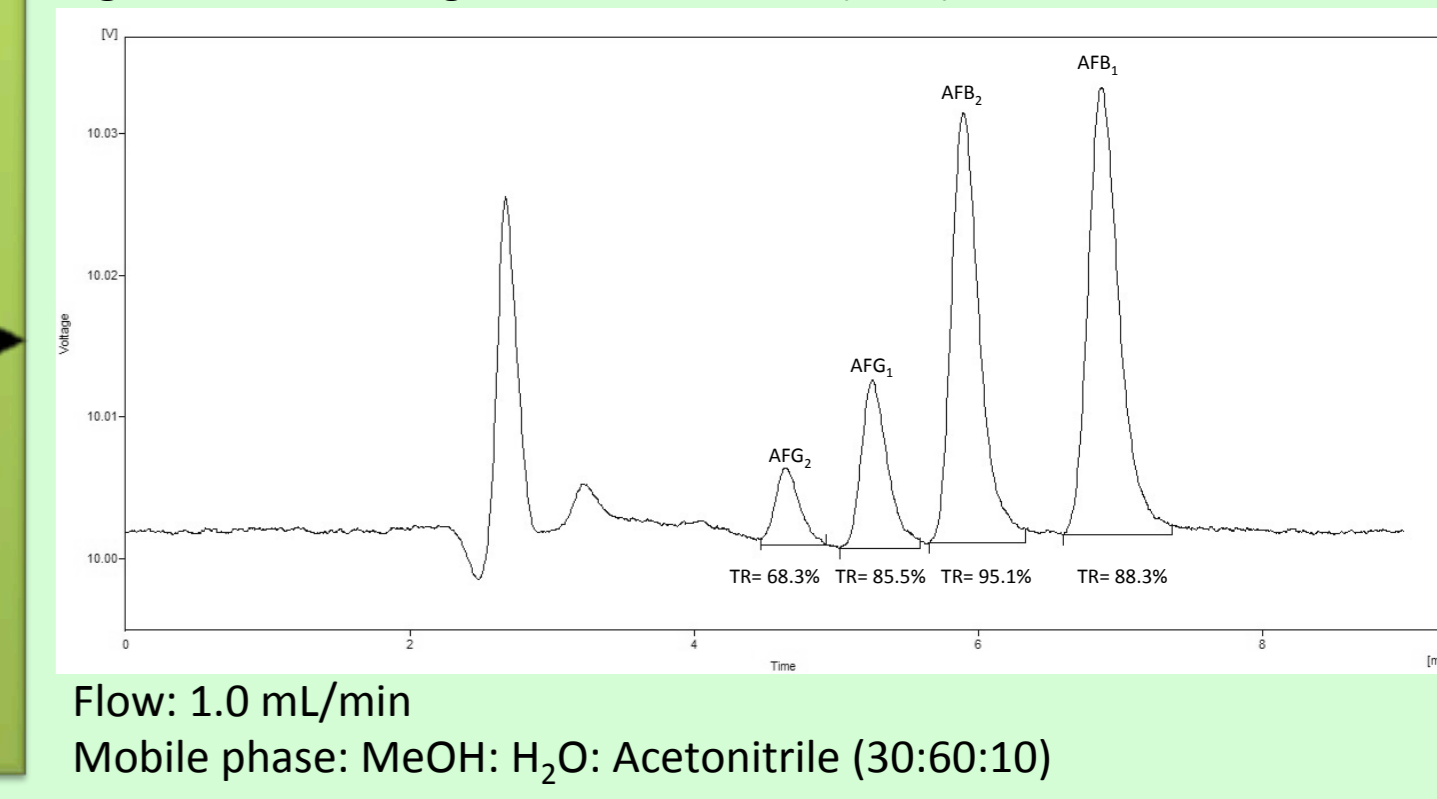
### HPLC Chromolith C<sub>18</sub> column (100 x 4.6 mm)

Figure 3. Chromatogram of ultrasound-assisted extraction (OTA-2)



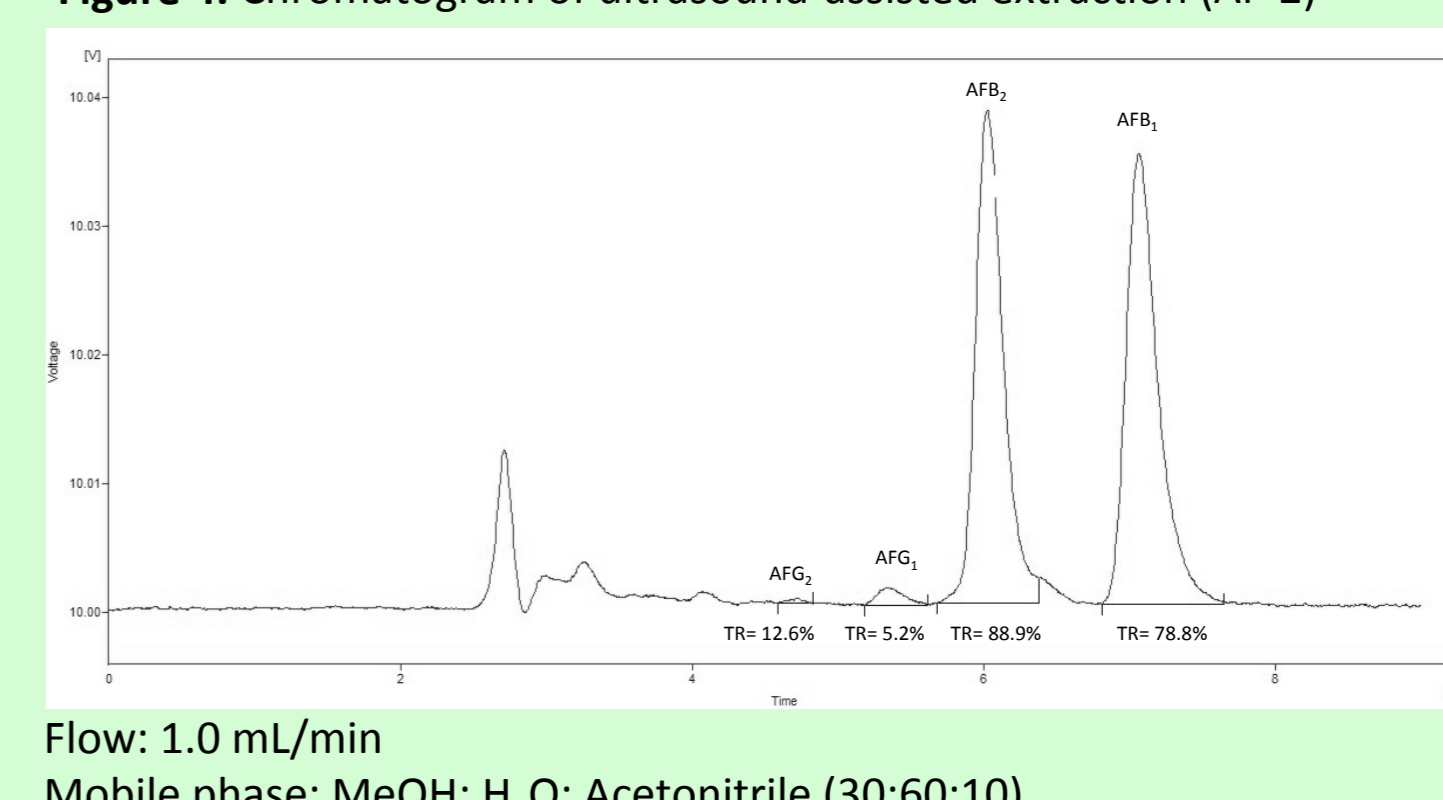
Flow: 0.8 mL/min  
Mobile phase: H<sub>2</sub>O: Acetonitrile: Acetic Acid (29.5:70:0.5)

Figure 5. Chromatogram of maceration (AF-3)



Flow: 1.0 mL/min  
Mobile phase: MeOH: H<sub>2</sub>O: Acetonitrile (30:60:10)

Figure 4. Chromatogram of ultrasound-assisted extraction (AF-2)



Flow: 1.0 mL/min  
Mobile phase: MeOH: H<sub>2</sub>O: Acetonitrile (30:60:10)

Table 1. Performance and precision of AFs and OTA extraction methods.

	AFB <sub>1</sub> *	AFB <sub>2</sub> *	AFG <sub>1</sub> *	AFG <sub>2</sub> *	OTA **
	(10 ng/g)	(3 ng/g)	(10 ng/g)	(3 ng/g)	(10 ng/g)
Mean Recovery (%)	88.3	95.1	85.5	68.3	80.6
RSD <sub>r</sub> (%)	8.3-14.4	5.4-5.5	8.9-12.7	2.7-18.0	2.5-5.6
RSD <sub>int</sub> (%)	3.3	0.4	8.4	23.4	1.1
Recommended Range (European Regulation No 401/2006)					
Recovery (%)	70-110				
RSD <sub>r</sub> (%)	<21	<22	<21	<22	<20
RSD <sub>int</sub> (%)	<32	<34	<32	<34	<30

\* Maximum Levels: 5 ng/g for AFB<sub>1</sub> and 10 ng/g for the sum of AFB<sub>1</sub>, AFB<sub>2</sub>, AFG<sub>1</sub> and AFG<sub>2</sub> (European Regulation No 165/2010 for spices)

\*\* Maximum Levels: 15 ng/g for OTA (European Regulation No 105/2010 for spices)

## Conclusion

Methods OTA-1 and AF-1 showed precision and recoveries within the legislated values and were found to be suitable for the extraction of OTA and AF for the matrix under study.

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