

Fungal volatile organic compounds: new targets for the detection of fungal contamination and mycotoxin production

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1 INTRODUCTION

25% of the world's foodstuffs are contaminated with mycotoxins

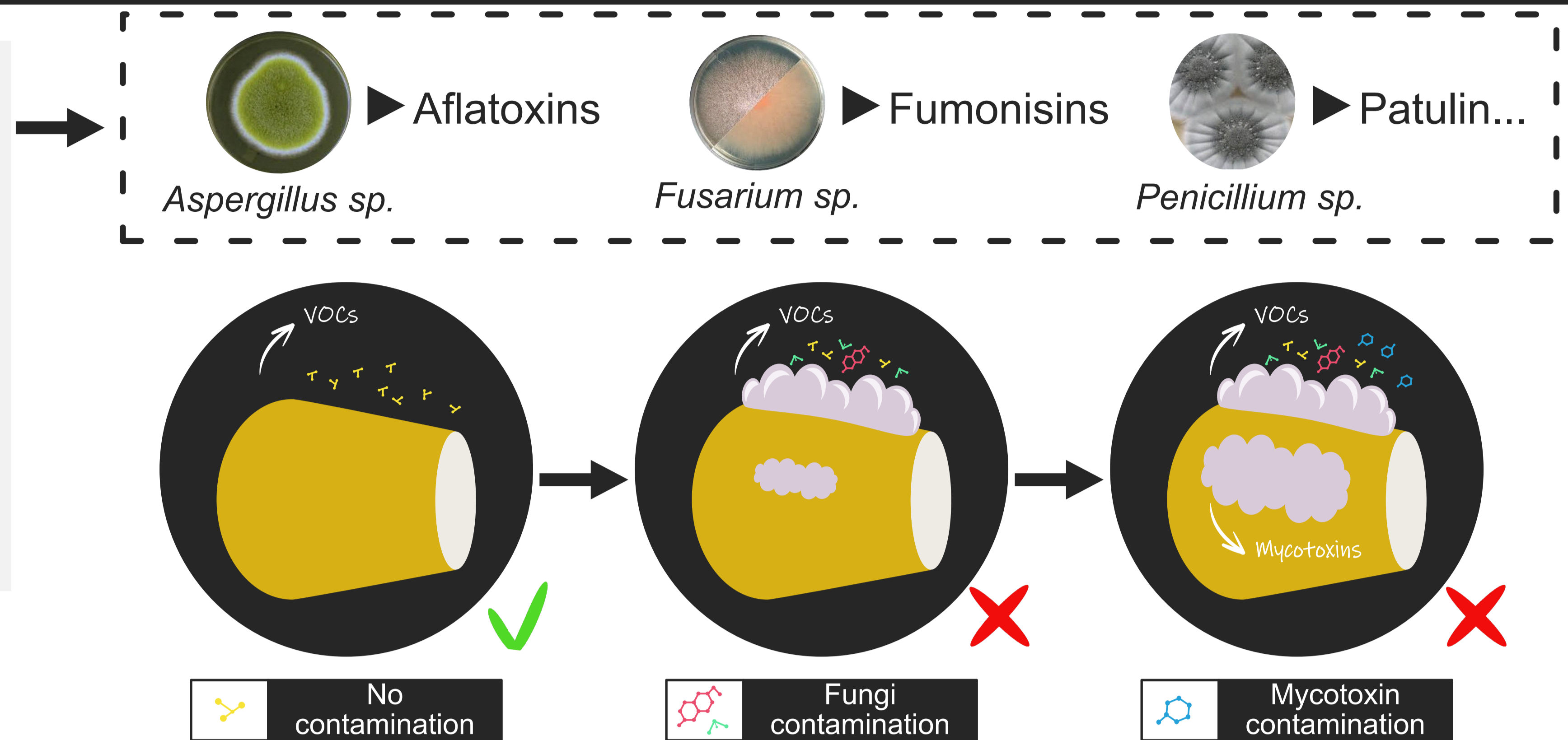


Thermostable - not destroyed by conventional cooking methods



Toxic at low concentration
- chronic exposition: cancer
- acute exposition: death

The contamination by fungi and mycotoxin can be detected by monitoring the Volatile organic compounds?



2 RESULTS - DIFFERENT SUBSTRATS

<i>F. verticillioides</i> at 23 °C on...	PDA	Maize
3-Methylbutan-1-ol	+	+
2-Methylbutanal	+	-
Styrene	-	+
Ethyl 2-methylbutanoate	-	-
Epizonaren	-	-
Germacrene D	+	-
Alpha-Gurjunene	-	-
Delta-Cadinene	+	-
Beta-Himachalene	+	-

The substrat influence the emission of certain VOC

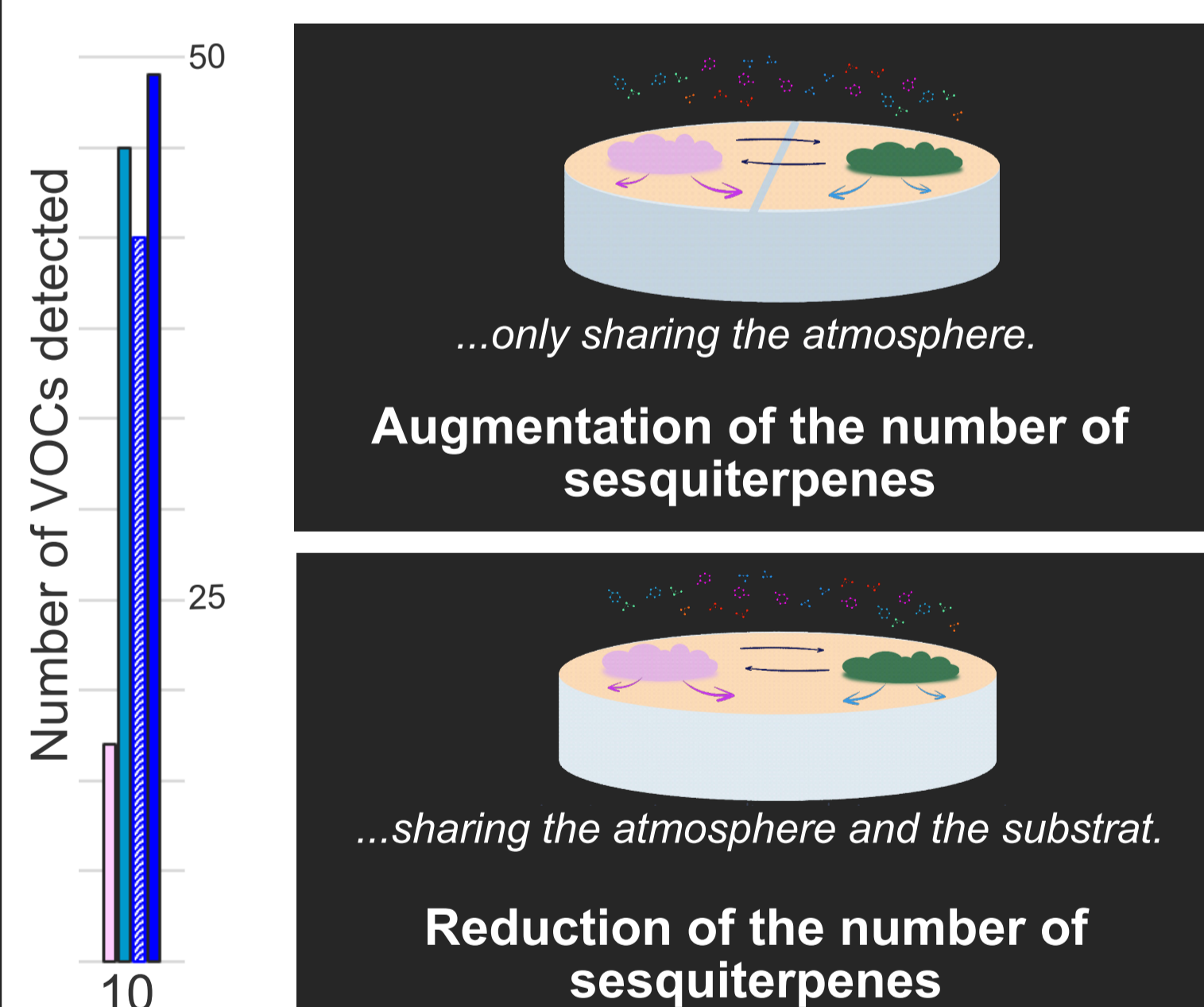
3 RESULTS - DIFFERENT TEMPERATURE

<i>A. flavus</i> on PDA at...	23 °C	30 °C
3-Methylbutan-1-ol	+	+
2-Methylbutanal	-	+
Styrene	+	+
Ethyl 2-methylbutanoate	-	+
Epizonaren	+	+
Germacrene D	+	+
Alpha-Gurjunene	+	+
Delta-Cadinene	+	+
Beta-Himachalene	-	+

The temperature influence the emission of certain VOC

The substrat (carbone source) and the temperature affect the VOC emission.

4 RESULTS - DIFFERENT CONDITION OF GROWTH

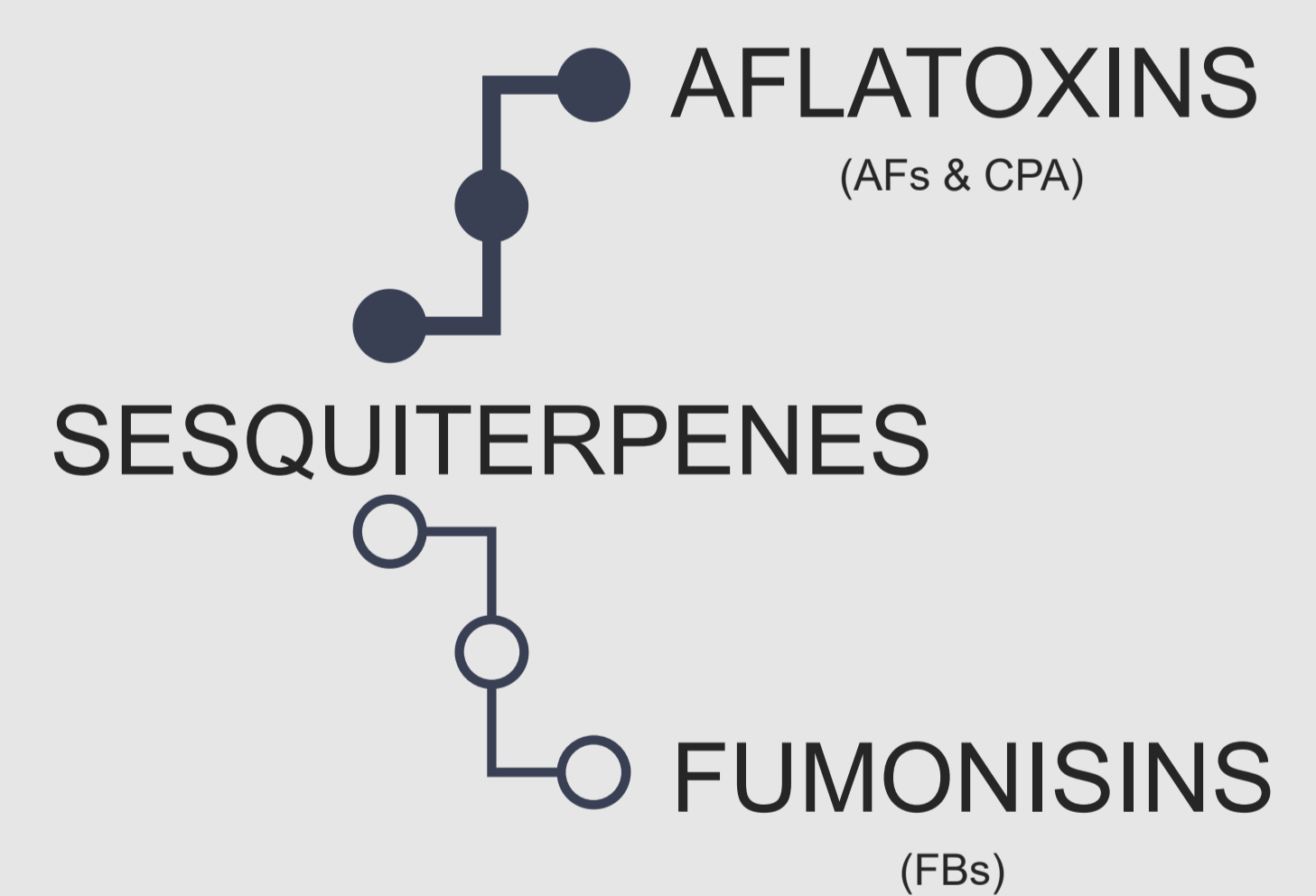


1 The presence of another fungi change the VOCs emitted.

2 The kind of interaction between the two fungi affect the VOC emission.

- *F. verticillioides* alone
- *A. flavus* alone
- *A. flavus* vs *F. verticillioides* in non-contact
- *A. flavus* vs *F. verticillioides* in contact condition

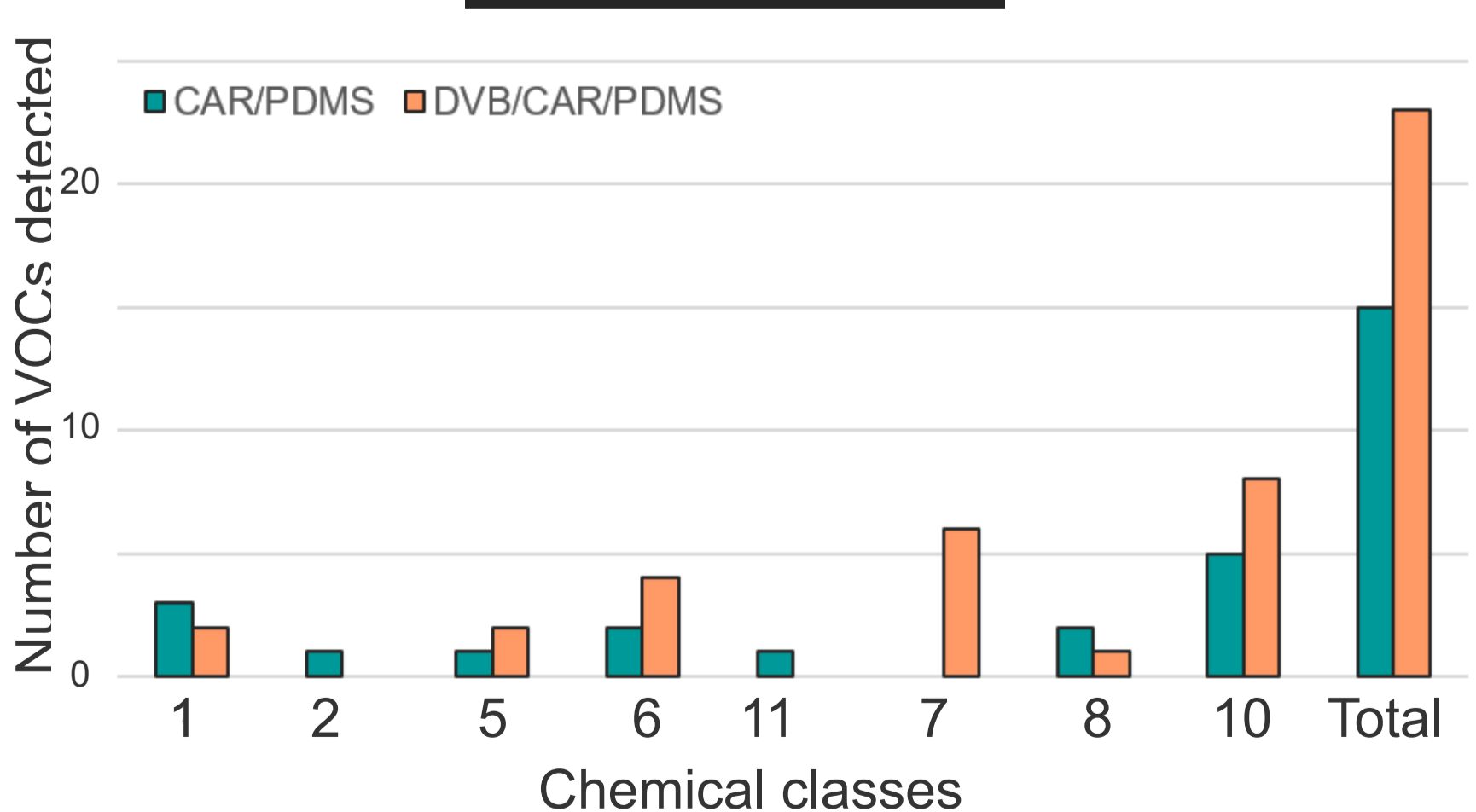
VOCs/Mycotoxins	AFs	FBs
Epizonaren	0.98	
Alpha-cadinene	0.97	
trans-Caryophyllene	0.97	
Beta-elemene	0.96	
Beta-selinene	0.95	
Germacrene D	0.94	
Alpha-gurjunene	0.93	
Alpha-copaene	0.93	
Cadina-3,5-diene	0.93	
Alpha-calacorene	0.92	
Delta-elemene	0.90	
1,4-Cadinadiene	0.88	
Delta-cadinene	0.88	
Epi-cubenol	0.83	
(1r,4r,5s)-Alpha-acoradiene		0.89
Beta-acorenol		0.75
Alpha-cedrene		0.71



The environnement of the fungi influence the VOC emitted.

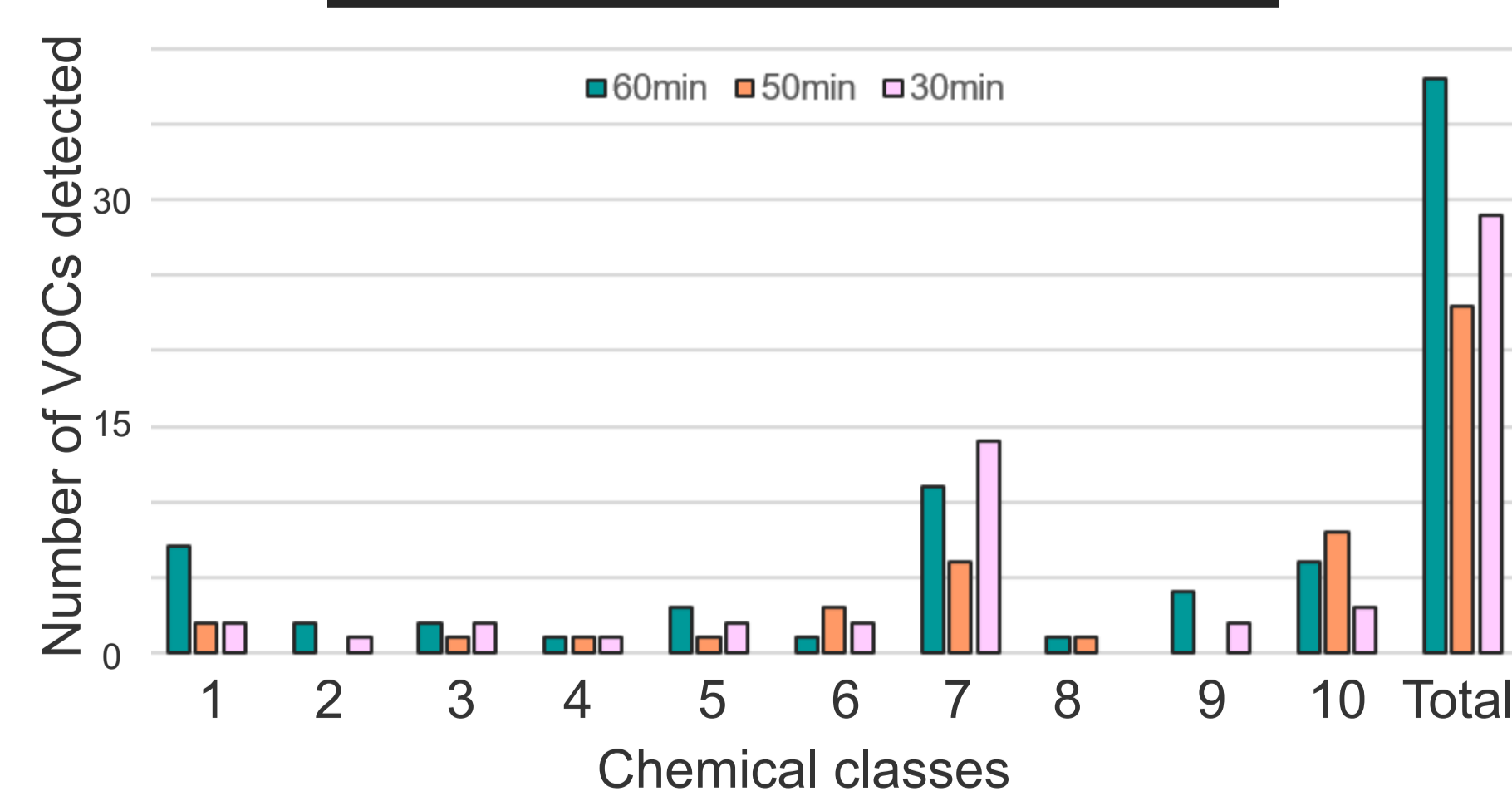
5 RESULTS - DIFFERENT SAMPLING

Type of SPME



Number of VOCs detected higher with the SPME triple phase.

Time of SPME exposition



Number of VOCs detected change depending of the time of exposition.

The choice of extraction conditions influences the detection of VOCs.

Chemical classes: (1) Alkane (2) Alcohol (3) Alkyle (4) Amide (5) Aryle (6) Ketone (7) Ester (8) Furan (9) Monoterpenenes (10) Sesquiterpene (11) Epoxyde (12) Aldehyde (13) Ether (15) Amine

6 CONCLUSION

Many parameters affect the VOCs emission and detection.

Some VOCs constanly emitted can informed on the fungi contamination and mycotoxin production

