

# Complementarity of conventional and molecular methods in the assessment of fungal contamination caused by *Aspergillus fumigatus* complex in one Portuguese composting plant

Viegas C<sup>1</sup>, Quintal Gomes A<sup>1,2</sup>, Sabino R<sup>1,3</sup>

<sup>1</sup>Environmental Health RG - Lisbon School of Health Technology - Polytechnic Institute of Lisbon; <sup>2</sup>Institute of Molecular Medicine, Faculty of Medicine of Lisbon; <sup>3</sup>Micology Laboratory – Instituto Nacional de Saúde Dr. Ricardo Jorge  
For further information please contact: carla.viegas@estesl.ipl.pt

## Introduction

The handling of waste and compost that occurs frequently in composting plants (compost turning, shredding, and screening) has been shown to be responsible for the release of dust and airborne microorganisms and their compounds in the air <sup>1</sup>.

Thermophilic fungi, such as *A. fumigatus*, have been reported <sup>1</sup> and this kind of contamination in composting facilities has been associated with increased respiratory symptoms among compost workers <sup>2</sup>.

## Aim of the study

This study intended to characterize fungal contamination in a totally indoor composting plant located in Portugal. Besides conventional methods, molecular biology was also applied to overcome eventual limitations.

## Materials and Methods

Air and surfaces samples were collected through impaction and swab methods, respectively. The analyzed places inside this plant were: Maturation park, Waste screw, Maintenance workshop, Room process control, Pre-treatment and Centrifuges.

For molecular analysis, air samples of 250L were also collected from the same sampling sites using the impinger method. Molecular detection of *Aspergillus fumigatus*-complex was achieved by Real Time PCR (RT-PCR).



Fig. 1 - Equipment used for air samples collection to apply molecular methodologies

## References

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## Results and discussion

### ✓ CONVENTIONAL METHODS

#### AIR

- Nine different species of filamentous fungi were identified in air samples with a total of 982 isolates.
- Aspergillus* genus showed the highest prevalence (90.6%) of isolates.
- The complexes *Nigri* (32.6%), *Fumigati* (26.5%) and *Flavi* (16.3%) were the most prevalent fungi.



#### SURFACES

- Four different species were isolated in surfaces samples with a total of 1810000 isolates.
- Aspergillus* genus also showed the highest prevalence (60.8%).
- Mucor* sp. (39.2%), and the *Aspergillus* complexes *Nigri* (30.9%) and *Fumigati* (28.7%) were the most frequently found.

### ✓ MOLECULAR METHODS

Table 1 – Conventional and molecular detection and quantification of isolates belonging to *A. fumigatus* complex in the composting plant

Sampling sites	Air (CFU/m <sup>3</sup> )*	Surfaces (CFU/m <sup>2</sup> )*	Real Time PCR (Ct – Cycle threshold)
Maturation park	-	30000	+ (29.67)
Waste screw	60	-	+ (34.97)
Maintenance workshop	-	-	+ (37.07)
Room process control	-	10000	+ (33.02)
Pre-treatment	160	-	+ (32.56)
Centrifuges	20	300000	+ (37.41)

\* Total of colonies count  
+ Detected  
- Not detected

Results corroborated complementarity of conventional and molecular methodologies<sup>3</sup>, as in others studies already reported <sup>4–6</sup>.

## Conclusions

The results obtained highlight the need to apply conventional and molecular methods to assess occupational fungal exposure in highly contaminated settings.