

SPORE TRAP ANALYSIS WITH *CLADOSPORIUM* AND *PENICILLIUM* / *ASPERGILLUS* DIFFERENTIATION

Fungal spores are abundant in outdoor air, and this outdoor aerosol enters readily into buildings. Entrance occurs through intentional openings (doors, windows), tiny cracks, through poorly seated filters, and on materials and people that come into the building.

Why is this entrance a problem?

When studying indoor environments for the possibility of fungal contamination, these outdoor aerosols will appear on air and dust samples collected indoors. This normal population of spores must be taken into account when interpreting indoor sampling data.

Don't we already compare indoor and outdoor aerosols using, for example, indoor/outdoor ratios?

Yes, we do commonly use indoor/outdoor comparisons for interpreting indoor sampling data. However, these comparisons are often based only on total spore counts, or on comparisons of morphological groupings (e.g., "*Penicillium*/*Aspergillus* types") or on a generic basis (e.g., *Cladosporium*, see table 1).

Why is this a problem?

Comparing total counts is a problem because the indoor and outdoor aerosol populations are often different. So, if you have 10,000 spores outside and 5,000 inside, and you just look at the totals, it appears that the indoor environment is "better" than the outdoors. However, if we add the information that the majority of the spores outside are basidiospores and the majority inside are *Penicillium*/*Aspergillus*, then the data looks worse and suggests that *Penicillium* and/or *Aspergillus* may be growing indoors. Similarly, if you look at the line item for *Penicillium*/*Aspergillus* type spores, and the counts are twice as high outdoors than indoors, you might consider the indoor environment to be OK. However, there may actually be a problem if all of the outdoor counts are *Penicillium* and all of the indoor counts are *Aspergillus*. *Cladosporium*, which is the most common fungal taxon both indoors and out presents similar problems in that the species outdoors may be different than indoors.

Location	Inside		Outside	
	Raw ct.	Spores/m ³	Raw ct.	Spores/m ³
<i>Cladosporium</i>	179	2,387	221	2,947

Table 1. "Normal" approach: The "Normal" report analysis and format, with *Cladosporium* identified to the genus level, can hide data that suggests an inside source of spores. For example, if most of the spores inside are of a different type than those outside, this method of analysis and reporting will hide that fact.

What can we do about this problem?

Ideally, indoor and outdoor taxa should be evaluated on a species by species basis. Thus, one should compare *Aspergillus versicolor* levels indoors vs. *Aspergillus versicolor* levels outdoors. However, this level of identification generally cannot be done on spore traps, which are, by far, the most common approach used for fungal air sampling. Unfortunately, until we have much better technology, we are not going to be able to achieve this ideal situation.

Does EMLab P&K have a solution?

We've developed a new procedure for spore trap analysis that enables grouping *Cladosporium* spores into the groups. The three most common types that occur in indoor and outdoor air and all others (see table 2). We also are able to differentiate the majority of the most commonly found *Aspergillus* species that grow indoors from *Penicillium* and the other *Aspergillus* species.

How will this help me?

We have compared indoor and outdoor concentrations of our ordinary groupings of spore types and found that either *Cladosporium* species differentiation or *Aspergillus* differentiation would have helped with interpretation in many of these projects.

Location	Inside		Outside	
	Raw ct.	Spores/m ³	Raw ct.	Spores/m ³
<i>Cladosporium</i> Type I	132	1,760		
<i>Cladosporium</i> Type II	47	627	158	2,107
<i>Cladosporium</i> Type III			16	213
<i>Cladosporium</i> Type IV			47	627

Table 2. Improved approach: The improved analytical method and reporting format, with *Cladosporium* identified to four different groups, provides additional data that can identify inside sources of spores.

How do I use the new test?

You can either order the new analytical procedure up front, or you can use the old approach and then ask for reanalysis if you think it would help in your data interpretation. For further information on genus/species analysis of spore trap samples please contact EMLab P&K toll free at 866.888.6653.

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