

17 June 2022

Biodet Ref: 22/46021

Client Ref: [REDACTED]

ENGEO Ltd
124 Montreal Street
Sydenham
CHRISTCHURCH 8023

Attn: Jonathan Hupman

Dear Jonathan

Re: **SPORE TRAP AND SELLOTAPE® SAMPLES FOR MICROBIOLOGICAL EXAMINATION**

Building/Ref: [REDACTED]
Samples taken: 2 June 2022
Samples received: 8 June 2022
Samples analysed: 15 June 2022

Laboratory Number	Sample Type	Location
46021/1	Spore Trap	Outside dwelling
46021/2	Sellotape® swab	Outside cladding

METHODS:

The spore trapping sample (Non-culturable Method) was taken using a Buck BioSlide sampler and was analysed by ASTM D 7391 -20 'Categorisation and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy'.

The Sellotape® swab was analysed by ASTM D7658-17 (Reapproved 2021) Standard Test Method for 'Direct Microscopy of Fungal Structures from Tape'.

RESULTS:

Non-Culturable Air Spore Trapping Results:

See attached spore trapping report.

Macroscopic and Microscopic Examination of the Sellotape® swab:

Sample ID	Macroscopic features	Microscopic features and comments
46021/2	<p>Sample: Sellotape® swab</p> <p>Appearance: Dark discolouration noted across the tape.</p>	<p><i>Stachybotrys</i> were not detected.</p> <p>A high level of amorphous particulate with areas of a low-level <i>Cladosporium</i>-like fungus. Growth active. A low level of <i>Epicoccum</i> spores was also observed.</p> <p>Conclusion: Likely superficial fungal growth within a buildup of dust/ debris in response to condensed moisture on a surface.</p>

Note: Active fungal growth can be determined by the presence of distinct fungal hyphae and structures that readily take up stain.

DISCUSSION

The presence of fungi always indicates that moisture is or has been present.

Stachybotrys was not detected suggesting that conditions were not suitable for the growth of this fungus.

Cladosporium species are common air-borne contaminants particularly in outdoor air. They are commonly found on outdoor claddings, particularly timber and will also grow on surfaces that have a moisture level between 15 and 20%, often in response to slightly elevated moisture levels such as condensation. The main effect of the fungus is disfigurement of the surface that the fungus is growing on.

OVERALL CONCLUSIONS:

- The spore levels and types in the outdoor air were typical of an outdoor environment and were comparable to the Biodet averages for an outdoor air.
- The tape sample exhibited a high level of amorphous particulate with a low level of a *Cladosporium*-like fungus. This fungus is commonly found growing on outdoor claddings in response to slightly raised moisture levels.

RECOMMENDATIONS:

- The black discolouration on hard surfaces can be cleaned off by washing with warm soapy water.

I hope this information is of help to you. If you have any queries please do not hesitate to contact me.

Yours faithfully



Kate Fletcher

B.Sc.

The samples were tested as received.

This report must not be reproduced except in full.

NON-CULTURABLE AIR SAMPLING REPORT

DATE OF REPORT: 17 June 2022
BUILDING: [REDACTED]
DATE SAMPLE TAKEN: 2 June 2022
DATE SAMPLE RECEIVED: 8 June 2022
DATE SAMPLE ANALYSED: 15 June 2022
BIODET REF NO: 22/46021

CLIENT: ENGEO Ltd
 124 Montreal Street
 Sydenham
 CHRISTCHURCH 8023

Attn: Jonathan Hupman

Method: ASTM D 7391 -20 Categorisation and Quantification of Airborne Fungal Structures in an Inertial Impaction Sample by Optical Microscopy

Air Volume sampled: 150 litres of air. (Sampled using a Buck Bioslide sampler)

The final result is expressed as fungal structures per meter cubed (/m³). Limit of detection is 7 fungal structures per m³ (0 = <7)

Sample Number	Slide Number	Location	<i>Cladosporium</i>	<i>Penicillium/Aspergillus</i> type	<i>Stachybotrys</i>	<i>Chaetomium</i>	<i>Alternaria/Ulocladium</i>	<i>Pitheomyces</i>	<i>Drechslera/Bipolaris</i>	<i>Epicoccum</i>	<i>Curvularia</i>	<i>Fusarium</i>	Basidiomycete	Hyphal Fragments	Other Spore Types	Fungal Structures TOTAL /m ³	Spore Clusters	Pollen
46021/1	02344607	Outdoor	53	27	0	0	0	0	0	0	0	40	700	27	5367	6214	13	220

Particle Analysis - Extraneous Material

Sample No.	Slide Number	Location	Bacterial clusters	Siliceous	Fibres	Skin	Rust	Amorphous
46021/1	02344607	Outdoor	0	+	+	+	+	+

Particle Level Key

Abundant	+++++
High	++++
Moderate	+++
Light	++
Sporadic	+
Not present	0

CONCLUSIONS:

The spore levels and types observed were typical of an outdoor environment, and were comparable to the Biodet averages for an outdoor air.

Yours faithfully



Kate Fletcher

B.Sc.

The sample was tested as received.

This report must not be reproduced except in full.



Elaine Khor

B.Sc.



Fungal Direct Examination Test

Biodet Services Ltd status: **Proficient**

MEMBER OF NEW ZEALAND ASSOCIATION OF CONSULTING LABORATORIES

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BIODET OUTDOOR SPORE TRAP DATABASE

(Average counts taken from indoor sources throughout New Zealand between 2017 and 2020)

	<i>Cladosporium</i>	<i>Penicillium/Aspergillus</i> type	<i>Stachybotrys</i>	<i>Chaetomium</i>	<i>Alternaria/Ulocladium</i>	<i>Pithomyces*</i>	<i>Drechslera/Bipolaris</i>	<i>Epicoccum</i>	<i>Curvularia</i>	<i>Fusarium</i>	Basidiomycete	Hyphal Fragments	Other Spore Types	Fungal Structures TOTAL/m ³	Spore Clusters	Pollen Grains
Spring (Taken 1 September to 30 November)	787	54	0	0	2	1	0	4	0	25	151	19	3871	4914	83	156
Summer (Taken 1 December to 28/29 February)	2160	129	0	0	21	8	7	33	9	51	504	46	8969	11937	216	55
Autumn (Taken 1 March to 31 May)	1013	122	0	0	16	0	1	20	2	50	676	24	9418	11342	122	28
Winter (Taken 1 June to 31 August)	172	77	0	0	1	0	1	1	0	39	254	14	6479	7038	47	66

* This category was separated out from *Alternaria/Ulocladium* in 2020

INTERPRETATION OF RESULTS

Unless stated all sample traces are 100% examined at 1000x magnification which is higher than recommended in the methodology. This is to ensure the minute differences between fungal spores are more easily identified allowing them to be accurately categorised.

Due to the numerous variations observed with sporetrapping it is important that a microbiologist with experience interpret the results.

Bidet staff take part in the AIHA Proficiency Analytical Testing Program for Fungal Direct Examination. This is an international interlaboratory comparison program comprising of laboratories across the world. Results may be supplied upon request.

Bidet staff interpret the results based on the information given by the client, previous results (if known) and our experience gained from analysing spore trap samples and assisting with air quality investigations since 2003.

Many fungal types found in outdoor air can also be the types that grow indoors in response to moisture. This is why it is recommended to take an outdoor sample with each job to show what current 'normal' levels and types are for each geographical location. This allows Bidet staff to compare the indoor fungal species and levels with the outdoor fungal species and levels, as well as with our database, to determine whether there are any indications of moisture issues.

In areas where there are no moisture issues it is typical to find that fungal spore counts taken from non-air-conditioned indoor areas are similar to or lower than the outdoor air, where as fungal spore counts taken from well maintained HVAC air-conditioned areas are typically significantly lower than the outdoor air.

The presence of some fungal spores in an indoor environment even in low levels, such as *Stachybotrys* and *Chaetomium*, can be an indication that there are moisture issues. For other fungal types such as *Cladosporium* or Basidiomycete spores a 10-fold increase may indicate a site of fungal amplification. These subtle variations show why it is important that a microbiologist with experience interprets the results.

The 'Other Spore Types' category are comprised of microscopically unidentifiable fungal spores, Smuts/Myxomycete/Periconia and a range of ascospores (fungal spores produced in a sac or body in response to adverse environmental conditions) and some basidiospore types. The majority of these spores are not associated with specific health issues, but exist in the natural environment, especially where there is dense vegetation or soil. Levels will vary due to seasonal variation and proximity to vegetation etc. Occasionally a spore type not represented by any of the other categories is noted in this category, and if the level of this spore type was significantly different to the outdoor air or other indoor samples, it would be specifically commented on.