

Fungal Sample Data Discussion

This fungal sample data discussion provides information to help the report user understand that single event bioaerosol sampling only documents the conditions measured at the time and location of sample collection. Fungal and bacteria aerosols vary temporally and spatially due to numerous factors. Some of the significant data interpretation issues are discussed in the Sections: *Fungal Data Interpretations and Airborne Concentrations*; *Fungal Air Sampling and Weather Conditions*; *Indoor Environments and Dust*; and *Fungal Sampling Data Limitations*.

Fungal Data Interpretations and Airborne Concentrations

Typically, the source of indoor fungal spores is the outdoor environment. In a clean well maintained residential building, indoor airborne fungal concentrations will be similar to or lower than outdoor concentrations and the type of fungi will be similar, indicating that significant indoor fungal reservoirs and / or amplification (growth) sites *are not present*. Indoor fungal data interpretation (air and surfaces) usually includes a comparison with outdoor fungal levels and types.

Fungal sampling data must be reviewed by a professional familiar with the various factors influencing fungal results because outdoor air fungal levels and types can vary considerably with weather conditions, the time of day, time of year, near by activities, and distant upwind activities etc. Non-amplified indoor levels can be influenced indoors by HVAC system type and air filtering equipment, building cleaning practices, pet activities, carpet age, and indoor activities, etc. Multiple water losses and multiple mold growth areas in a building can result in difficult assessments and data interpretation.

Indoor fungal growth typically results from water losses, condensation on cold building surfaces, or high relative humidity. A small area of mold growth can significantly impact indoor air quality if disturbed; if left alone it may not become airborne. A large mold growth area that has produced billions of spores will likely impact air quality by just minor air movement. If disturbed, large areas can significantly impact air quality. Proper cleanup and correction of the water source is always recommended, regardless of the size of the actually mold growth. Mold growth should be properly removed from buildings.

Fungal Air Sampling and Weather Conditions

Weather has an important impact on ambient air fungi types and concentrations. Rain washes the air clean of many types of mold spores, while the rain drop splash assists in the dispersion of others. Bioaerosol sampling on, or shortly after, rainy, snowy, foggy or very humid days may result in outdoor counts that are low. Higher spore levels may result on windy days when there is more airborne material or on sunny warm days following a precipitation event.

Indoor Environments and Dust

Dusty interiors can contribute to a higher level of indoor spores on surfaces to some degree, but the fungal types should still mirror the outside distribution of spore types (assuming a non-damp interior). Another major factor influencing the indoor spore distribution is the accessibility of outdoor air and spores (open windows and doors, and heavy foot traffic in and out). Proper indoor cleaning reduces building dust and the normal accumulation of settled fungal spores. There will always be some normal level of fungal components (spores and mycelia fragments) in the indoor air and on surfaces, unless they were just cleaned. Cleaner buildings will have lower levels of dust and fungi on surfaces in terms of spores / cm². The levels in a clean building may be similar to a dirty building on a spore count / gram of dust; therefore, the reviewer must consider the units reported for the sample collected. In most cases, humid climates have a higher natural background of ambient environmental air bioaerosols. Good filters on HVAC systems will remove larger fungal spores during system operation and indoor fungal levels may not mirror outdoor levels and types. Some buildings may be designed to maintain lower levels of indoor fungi such as pharmaceutical clean rooms, hospital surgery areas, or improved indoor areas for sensitive people.

All buildings with carpet will have some level of fungal propagates entrained in the carpet. Carpet serves as a reservoir for dust and mold spores. Carpet that has been wet and has fungal growth should be properly removed. Carpet can act as a reservoir for dust and spores, and normal cleaning seldom removes fine debris deep in the carpet and pad. Therefore, activity on the carpet can create a temporary dust cloud of re-entrained material (which has been deposited over a period of several months) that does not mirror current outside conditions. This material may not reflect current outdoor fungal conditions. Determining what fungal levels are normal or typical background levels and which are amplified requires a review of past use, current operating conditions, detailed inspection, moisture mapping, and proper sample collection, laboratory analysis and interpretation.

Fungal Sampling Data Limitations

In summary, a single event bioaerosol sampling only documents the conditions measured at the time and location of sample collection. ***A significant difference in spore levels and spore distribution between sample locations is often needed to document that air quality is truly impacted by an indoor source of fungi. Detailed visual observation and bulk and surface sampling of suspect building materials should also be used to evaluate a complaint building or room.***