MOULD FUNGI AND INDOOR AIR QUALITY IN OLD TRAPPER HUTS AT SVALBARD

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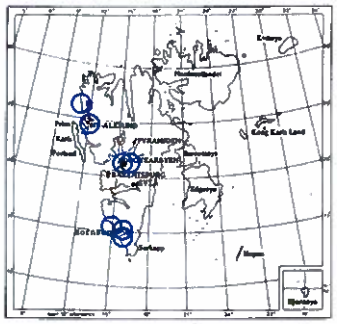
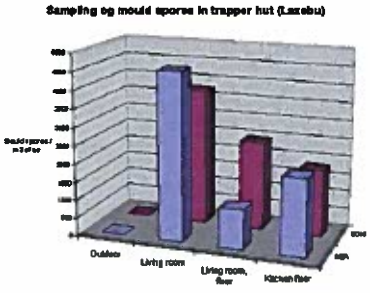
In the early 1900 several trapper huts and buildings related to industrial activity were built at Svalbard. The buildings consist mainly of wooden materials and they are constructed in an unsophisticated way, with the floor beams and other wooden materials in direct contact with the soil. Walls and roof in the buildings are either massive timber structures with wooden panel, or timber frame work with wooden panel on both sides. In some cases the exterior walls are covered by dense bitumen felt in order to prevent the wind blowing through the walls.

In several of the buildings mould growth has been observed on various surfaces, both building materials and inventory. Such growth normally causes poor Indoor Air Quality, and sampling were done in order to clarify the situation in the buildings.



Sites at Svalbard where air samples have been taken in trapper huts



Sampling of mould spores in trapper hut (Laxebu)

A trappers hut with a thick layer of turf for insulation purposes. This keeps the water content high inside the walls

Methods and Results

Air samples of viable mould spores were done by a MicroBio (a version of Anderson one-stage sampler) that collected the fungal spores in 100 liters of air on an agar plate. In order to yield both fungi that grow at high water activity and species that grow on low water activity two media were used (MEA and DG 18).

Air samples has bee taken from buildings at various localities, as shown at the map. The procedure of sampling was to gently enter the rooms in order to not stir accumulated dust, and take the samples from the air at ca. 150 cm above the floor.
Sampling in 14 huts was performed in May 2004 and August 2009.

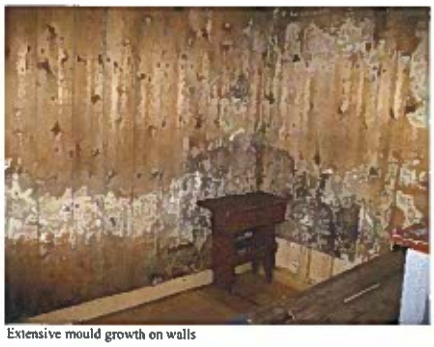
The analysis of the samples was done in light microscope, up to x1000 magnifying. Samples of viable mould spores from the air were analysed by counting the number of colonies after 7 days of cultivation at 22 °C. The species were then identified by light microscope.

Outdoors the number of spores varied from 0 to 355 cfu/m3 of air, with an average of 62 cfu/m3 on MEA and from 0 up to 374 cfu/m3, with an average of 50 cfu/m3 on DG18. Inside the buildings, the amount of viable spores varied from 0 up to 6869 cfu/m3, with an average of 701 cfu/m3 on MEA, and between 0 and 6257 cfu/m3 with an average of 767 cfu/m3 on DG18.

Of the 14 buildings where air samples were taken, the results showed that five of them had no sign of unnatural occurrence of mould spores regarding to amounts of types and four buildings with a minor influence of undesired mould exposure. Five buildings had an unacceptable indoor air climate, as shown in the figure.

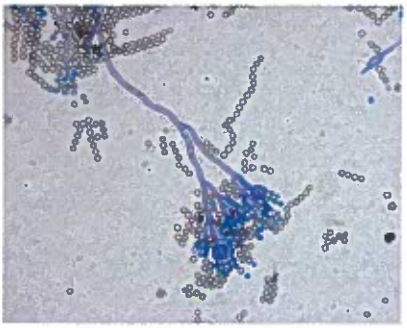
Discussion and Conclusions

It is shown that the mould damages can cause severe negative influence on the indoor air quality in the old trapper huts. Several of the buildings are more or less frequently in use, and further use of these buildings is not recommended before proper remedial treatments have been done. The repair work includes a need for both extensive dismantling of floor and wall constructions and improvement of protection against further moisture conditions. Unfortunate, some of the measures are in conflict with the desire of doing as less impact as possible on the protected buildings.



Extensive mould growth on walls

The mould species Penicillium chrysogenum was commonly found



The wall surface is contamintated by extensive mould growth

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