Mold growth on pine and spruce wood: The dependence on moisture content, anatomical direction and mold species

Pavla Ryparová[1], Kamil Staněk[2], and Pavel Kopecký[1]

[1]*FCE, CTU at Prague, Czech Republick*
[2]*UCCEB, CTU at Prague, Czech Republick*

Mold growth on pine and spruce wood: The dependence on moisture content, anatomical direction and mold species

Wood materials are used in wooden or natural houses as well as in conventional construction. Wood is also a natural substrate for mold growth. The occurrence of mold in homes may pose a threat to human health. Better knowledge about the conditions for mold growth on wood could improve the mold growth prediction models, prevent health risks, and increase the durability of wood without any additional biocidal treatment.

Mold growth depends on the surrounding condition and the available nutrients. The main requirements for mold growth are suitable relative humidity, temperature, wood specie, and availability of nutrients. The most effective measure to prevent the mold growth in wood-based houses is to keep the indoor relative humidity sufficiently low.

We studied the dependence of mold growth on the ambient relative humidity (75 - 95% RH) at 23 ° C with respect to the anatomical direction of wood and mold species. The mold mixture studied was *Penicillum sp., Aspergillus sp*., and *Alternaria sp.* The samples were prepared from pine and spruce sapwood. The monitored parameters were the time of germination and the degree of coverage of the samples.

It was found that these parameters are more dependent on the relative humidity than on the direction of the wood fibers. Mold growth began at a relative humidity above 75 %. The humidity of around 87 % was more suitable for the germination of Penicillium sp., the humidity of around 95 % for the germination of Aspergillus sp. The liquid water stopped mold germination. The time of germination was between 7 and 24 days in the absence of liquid water in the samples. The time to achieve the maximum coverage of the samples was more dependent on the direction of the wood fibers and was between 24 - 69 days for the conditions without liquid water. The extent of maximum coverage depended on the amount of nutrients available and the direction of the wood fibers.

This work was supported by the Czech Science Foundation (GAČR) (Grant number: 20-12941S). The authors also thank to laboratory technicians Ivana Loušová a Petra Schutová.