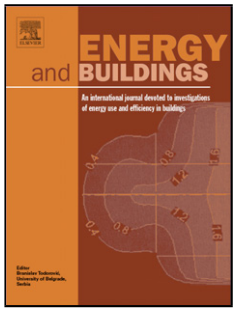

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The effect of an Indoor Living Wall System on humidity, mould spores and CO2-concentration

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Abstract

This paper shows the investigation of a living wall system inside a classroom. Humidity, temperature and the CO2-concentration were measured in two classrooms with the same volume. One of the classrooms is equipped with a living wall system. Air temperature and relative air humidity were investigated for 10 months including summer and winter months. In winter the increased relative air humidity of the greened classroom improved the comfort level. In summer mould spores were also investigated in the classrooms and outdoor. Spores from Cladosporium, Penicillium, Aspergillus versicolor, Alternaria and other were found, but the concentration of the mould spores in the greened classroom was below the mould spores concentration in the not greened classroom or outside. The volume of the mass of the plants is about 1 % of the classroom´s volume. But still a small CO2-reduction because of the plants was measured.

Keywords: Indoor greening; mould; indoor climate; air comfort; air humidity

1. Introduction

While the effect of outdoor greening on its surrounding microclimate is investigated in many papers already [1-8], the effect of indoor greening on the indoor climate of the room is less known. Usually the effects of dust and volatile organic compounds (VOCs) are investigated of indoor pot plants [9-11]. In [11] the investigations were focused on the reduction of volatile organic compounds and the CO2-concentration because of pot plants. It turned out that there is a high capacity for pot plants to remove VOCs. The CO2-concentration was researched in a laboratory chamber. The result was, that there is a very low reduction of CO2 because of pot plants. The uptake rate for these plants was measured to be 2.8 mg CO2 $m^{-3}m^{-2}h^{-1}$. But there were no investigations of the effect of living wall systems on the indoor climate in this paper. This is investigated in the present paper, by measurements in a school in Vienna, Austria.

The spatial conditions in schools have a significant influence on behaviour, welfare and on the performance of students and teachers. In most cases the conditions of the indoor climate in classrooms is not optimal what affects health and concentration of the students in a negative way [12-13]. For example the parameters temperature, relative air humidity, mould spores, and CO2-concentration need to be in a comfortable range. Each of them can influence the power of concentrations or cause illnesses when the comfortable range is exceeded [13].

There are several publications about the optimal temperature and the optimal humidity in houses and rooms [14-16]. In [16] it is evaluated that the temperature should range from 17°C to 25.5°C. The comfort area of relative air humidity depends on the temperature. It should never fall below 18 % or