

# HEATER CHOICE AND MOULD GROWTH IN NEW ZEALAND HOMES: AN INTERVENTION STUDY.

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The relationship between heaters (unflued gas heater (UGH, N=14), heat pump (HP, N=12)) and mould growth was investigated in the living rooms and bedrooms of 26 New Zealand homes during winter season. The suitability of the wall environment for fungi development was estimated via a fungal detector. This fungal detector consists of three permeable fungi inclusions of pre-culture spores which are placed between two plastic slides. Two inclusions were xerophilic fungi (grow under relatively dry conditions) and the third was hydrophilic (grow under relatively humid conditions). After a month of exposure, the hyphal lengths of each inclusion were measured under a microscope and were compared to the wall psychrometric conditions (temperature and relative humidity measurements).

The average wall psychrometric conditions were found significantly different in the two groups of households in both the living rooms (15.2°C/63.6% for UGH users vs. 17.4°C/53.5% for HP users and the bedrooms (13.9°C/68.6% for UGH users vs. 16.0°C/60.9% for HP users). For both xerophilic fungi, the average daily hyphae growth rates were 4 times higher in the living rooms of UGH user group than HP user group (1.17 µm/day vs. 0.30 µm/day), and 22 times in the bedrooms of UGH user group than HP user group (10.8 µm/day vs. 0.48 µm/day). No differences were found for the hydrophilic fungi for both household groups. Studies showed that xerophilic fungi are considered as first colonizers (first to react to environment changes) whereas hydrophilic fungi need very humid condition to start germinated (Darby and Caddick, 2007, Flannigan and Miller, 2011).

UGH was found to be a significant additional source of moisture which dramatically increases the capacity for xerophilic fungi to grow on wall surface. Unvented gas heating appliances should be more regulated and ideally should not be operated in homes.

DARBY, J. A. & CADDICK, L. P. 2007. Review of grain harvest bag technology under Australian conditions. A comprehensive analysis and field evaluation of harvest bag technology: incorporating a review of hermetic and temporary storage, control of insects and fungi, and preservation of grain quality, under typical Australian storage and handling conditions. *Technical Report - No. 105. Australia: CSIRO Entomology.*

FLANNIGAN, B. & MILLER, J. D. 2011. Microbial growth in indoor environments. In: FLANNIGAN, B., SAMSON, R. A. & MILLER, J. D. (eds.) *Microorganisms in home and indoor work environments : diversity, health impacts, investigation and control (2<sup>nd</sup> edition).* London, UK: Taylor & Francis.

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