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Abundance and Enzyme Activity of Airborne Microorganisms in the Experimental Green Wall System

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Abstract **-** Recently the modern green wall (GW) systems with active air circulation, higher plants and optimized growth media are becoming increasingly more efficient for indoor air biofiltration. However, the functioning mechanisms of these complex systems are still poorly investigated. This study was focused on the activity of biofilm on the ceramic granules, which has been developed in the experimental GW within four months under realistic office conditions. Microbial abundance on the surface of ceramic granules has been evaluated by the number of culturable heterotrophic bacteria, as well as enzyme activity, i.e., fluorescein diacetate (FDA) hydrolysis and potential ammonium oxidation (PAO). Different pre-treatment types of granules, i.e., grinding and sonication, showed significant ($p<0.05$) differences in FDA and PAO activities. The microbial activity of biofilm derived from the surface of ceramic granules in pots with *Epipremnum aureum* placed on the 1st, 3rd, 5th, 7th and 9th height levels, did not exhibit a linear dependence on the height. Particularly, the FDA hydrolysis on the granule surface varied in the range from 167.4 µg/g on the 3rd level up to 463.9 µg/g on the 1st level. Contribution of the GW to the concentration of airborne microorganisms in the air was found to be negligible. Further experiments will be focused on the GW performance in terms of biodegradation of volatile organic compounds.

Keywords**:** Biofilm; Ceramic granule; Green wall; Indoor air; Fluorescein diacetate hydrolysis; Potential ammonium oxidation