

Microbial assessment of biological colonization on roofing tiles

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ABSTRACT

Biological colonization of roofing tiles affects not only the aesthetic aspect of the roof but also its functionality. Herein, we analyzed the composition of natural microbial communities developed on roofing tiles aiming to be able to reproduce the colonization process as a method to evaluate the bioreceptivity of roofing tile materials.

In this study, both molecular and culturing techniques have been carried out. Cultures were developed in order to reproduce the capabilities of different types of microorganisms to develop on roofing tiles in laboratory experiments. Bacteria, fungi, microalgae, and cyanobacteria were cultured and classified taxonomically by DNA-based molecular analysis using the small subunit of the ribosomal RNA gene (16S and 18S for prokaryotes and eukaryotes, respectively).

Microbial community fingerprints were obtained from naturally colonized roofing tiles and both phototrophic and heterotrophic cultures were prepared. Several strains of *Streptomyces* sp., a fungus (*Fusarium* sp.), and mixed cultures of phototrophic microbial communities were isolated and assayed for their capability to colonize roofing tiles. Complex microbial communities naturally develop on roofing tiles constituting the first stage in the colonization of these covering materials by on macroscopic organisms. Representative microorganisms constituting these microbial communities were cultured and evaluated by their ability to develop on these roofing materials. Our results demonstrate that roofing tiles are highly bioreceptive to microbial colonization and the process can be reproduced under laboratory conditions.