

**TITLE:** MICROBIAL ECOLOGY OF FILAMENTOUS FUNGI ASSOCIATED WITH STONE DETERIORATION OF HISTORICAL MONUMENTS

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**ABSTRACT:**

The occurrence of microbial growth on stones is initially an aesthetic problem since the visible microbial growth may alter the appearance of buildings and sculptures of historical monuments. However, in many cases, their metabolic activity is the main cause of the deterioration of stones and even overlaps physical weathering. Biological deterioration consists of an undesirable change in the properties of the material, which is caused by the metabolic activity of an organism involved in the biotransfer of chemical elements in biogeochemical cycles. This work aims to identify the filamentous fungi involved in this harmful process on the stone, and to study the dynamics of the cultivable microbial community isolated from the stone surface. For this, during twelve months, biological samples were collected with a sterile spatula and then a serial dilution between  $10^{-1}$  to  $10^{-5}$  in saline solution 0.85%, supplemented with Tween 80 0.001% were obtained. Aliquots of 100  $\mu$ L were plated on Czapek Dox Agar by spread plate method and incubated for 14 days at 27°C. Fungal colonies were isolated and identified by macroscopic and microscopic characteristics by classical methods. The identification of the fungi was confirmed by sequencing of the region ITS1 and ITS2 by DNA extraction and amplification of the polymerase chain reaction using primers ITS1 and ITS4. The results showed the correlation between the analysis of cultivation and by molecular analysis, especially with the dominance of some species and genera associated with biodeterioration process. The ecological parameters such as species richness (S), abundance, diversity index of Shannon-Wiener (H') and dominance revealed the dynamics of the community of fungi cultivable found on the surface stone, highlighting a greater diversity of species during the rainy season (H' = 2.617) compared to the dry season (H' = 1.034). The occurrence of some species of fungi influenced the analysis of community dynamics from an ecological point of view, especially regarding diversity indexes analyzed, abundance and species richness. Moreover, the profiles of the rarefaction curves obtained clearly showed this influence on the ecological parameters.

**Keywords:** Deterioration, stone, filamentous fungi, ecology, historical monuments

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